MAY, 1954

PRODUCTS finishing

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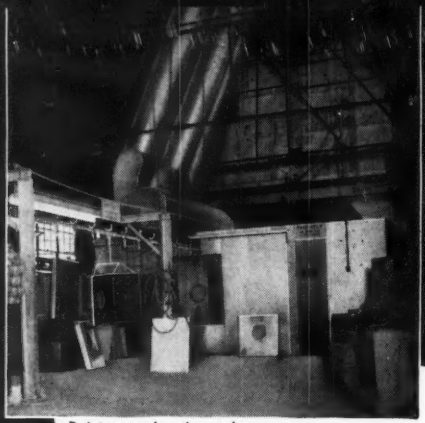
Finishes on *Metal* Products

space-saving Cincinnati FINISHING SYSTEM

handles both prime and finish operations

...at Caloric Stove Corporation



Paint spray booths; and overhead air make-up system.

Saving floor space is a valuable asset to Caloric as to all major manufacturers. Cincinnati engineers designed a complete finishing system with this need uppermost in their minds.

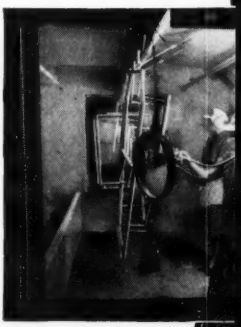
The operation begins with a 5-stage washer capable of handling Caloric's present production and yet with the capacity of doubling the output whenever it becomes necessary.

The second unit consists of a 400° gas-fired recirculating air dry-off system to dry the work completely after phosphatizing.

Third, the work passes through a huge combined air makeup and pressurized room consisting of two large spraying areas. Either prime or finish coats may be applied while the work is carried on a 1054 foot conveyor designed to carry the work continuously through the entire operation.

The material is then elevated up through a 500° floor supported oven leaving a working area underneath with a 9 foot clearance for parts storage and assembly operations. This unit is also a gas fired recirculating design having 300 feet of conveyor inside the oven permitting a full half hour of baking time at 500°.

A complete, properly designed finishing system can give *you* increased production at lower costs, more uniform results and greatly reduced handling costs . . . save you space at the same time. Consult Cincinnati . . . for a complete finishing system or any part, engineered-fabricated—installed . . . to your complete satisfaction.



Prime coat spray application.

Parts emerge from dry-off, prior to painting.

OPERATIONS

1. Cleaning & Phosphatizing
2. Pre-Paint Drying Oven
3. Air Makeup and Paint Spray Booth
4. Paint Bake Oven
5. Completely Conveyorized

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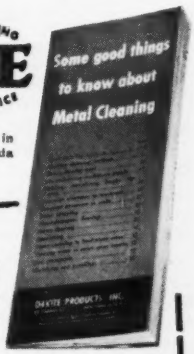

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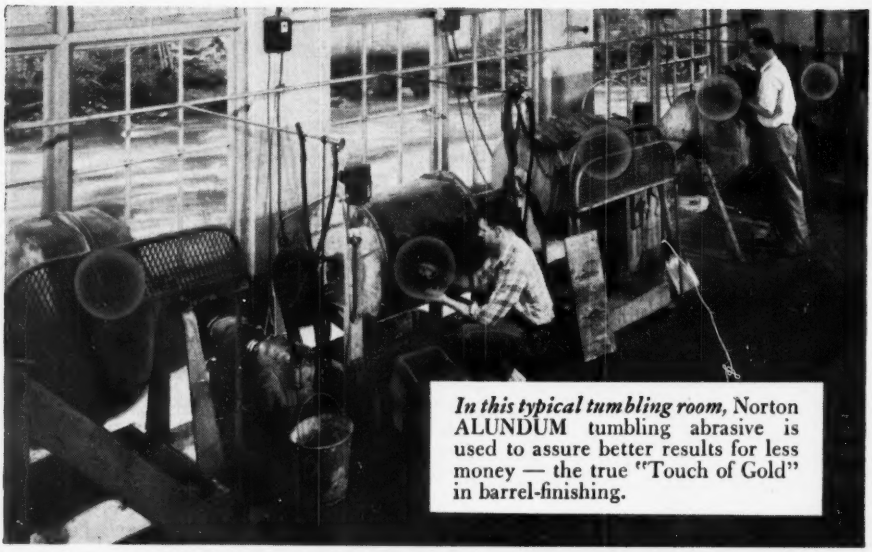

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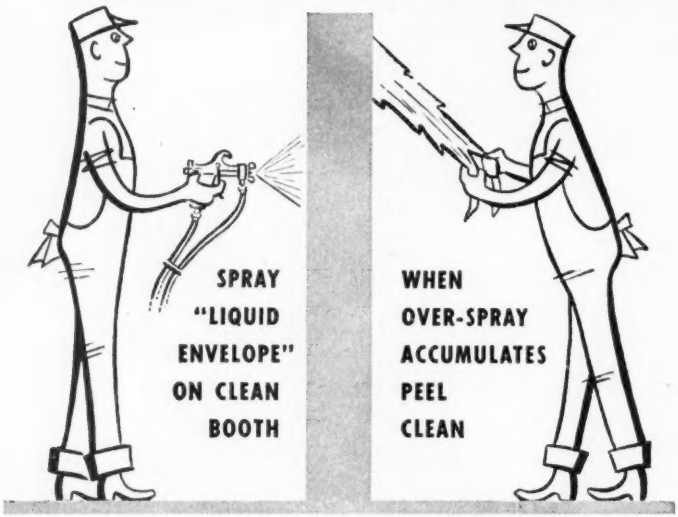

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Products Finishing

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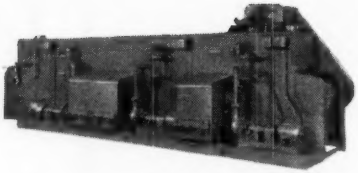

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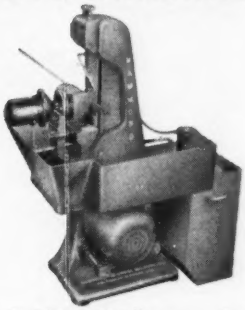

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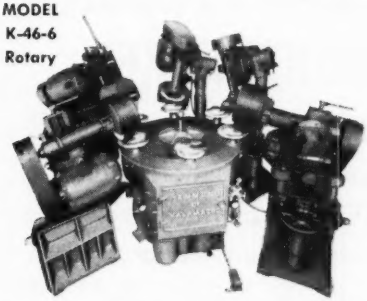

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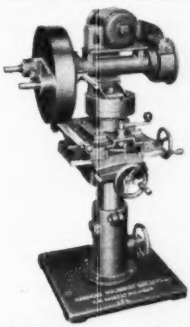

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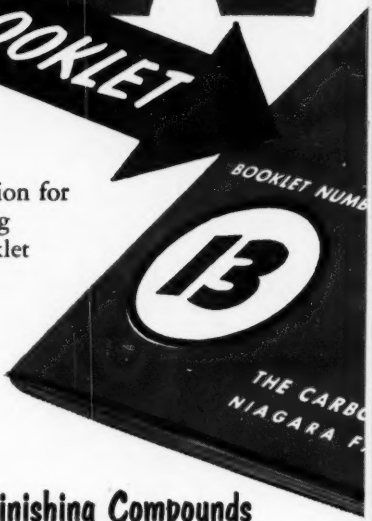

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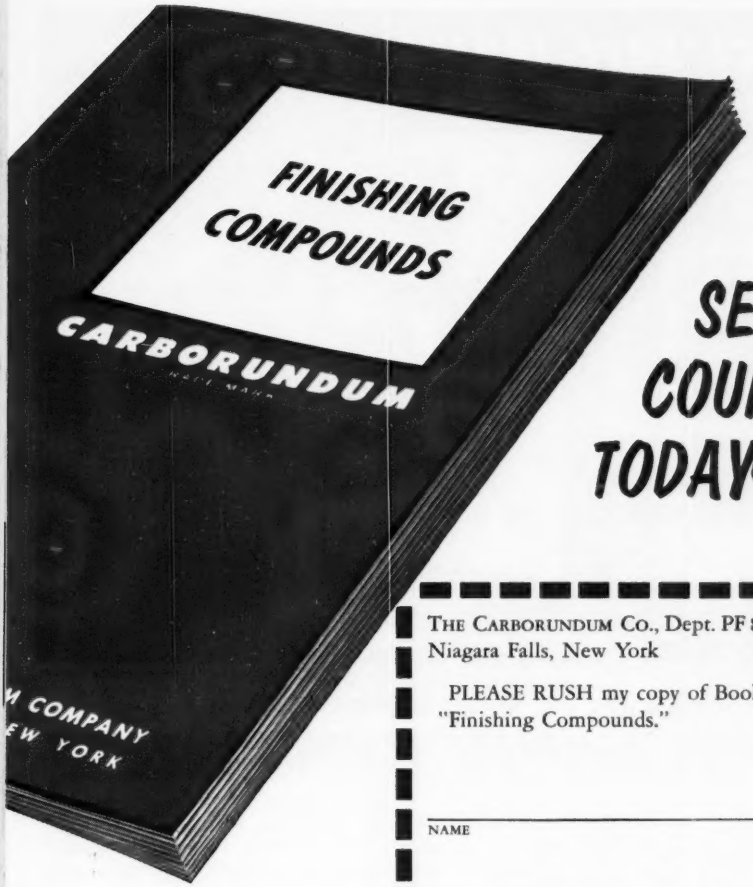

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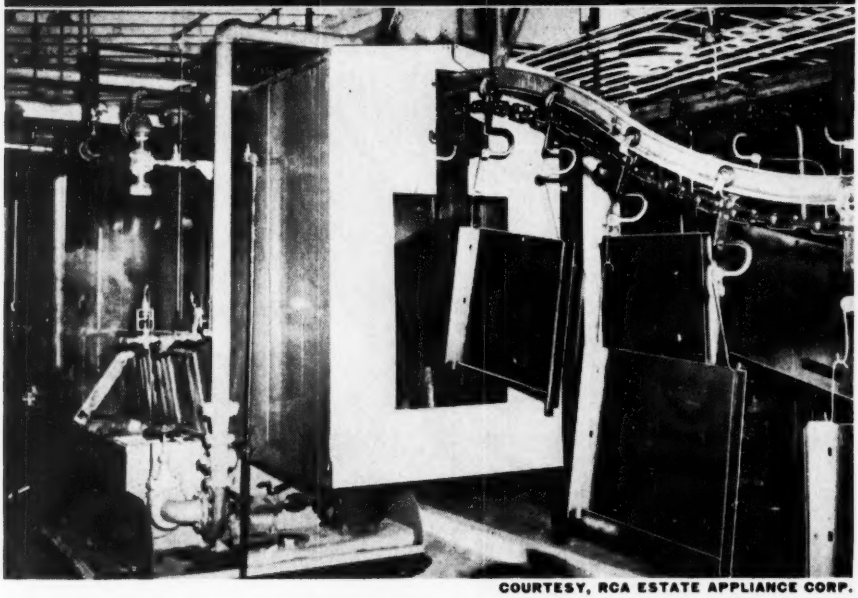

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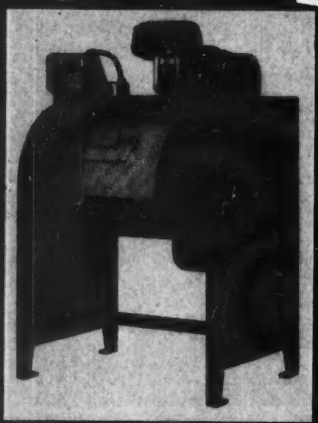

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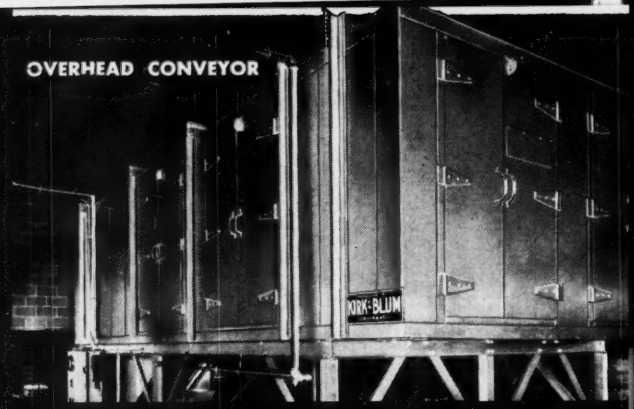

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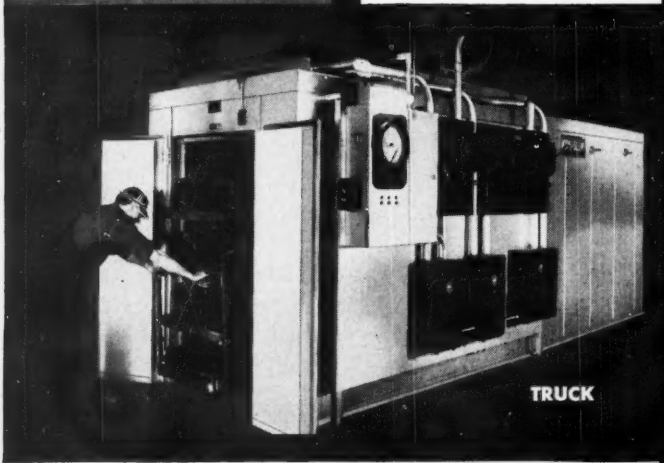

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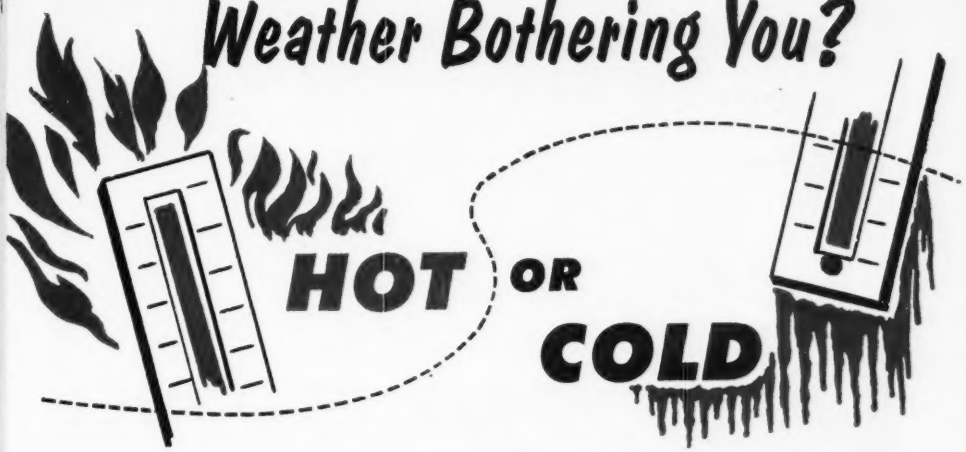

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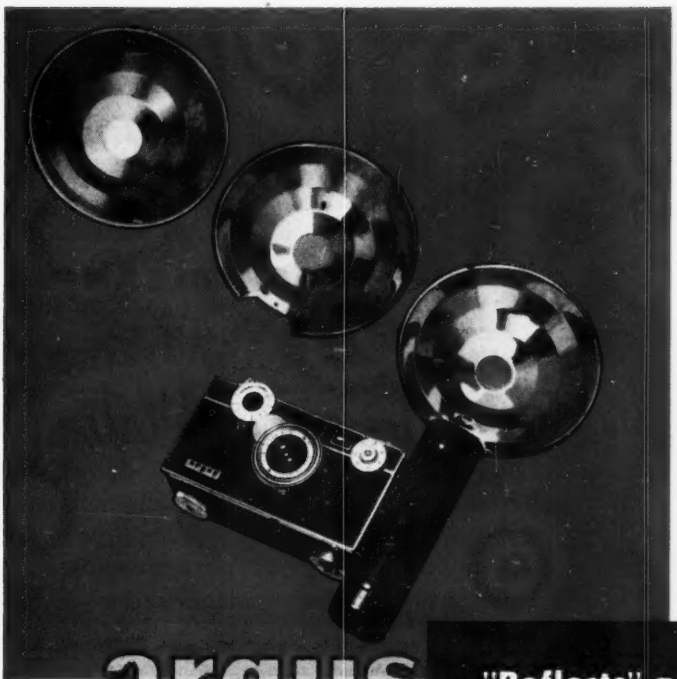

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Pf editorial

Vol. 18, No. 8

MAY, 1954

Why Attend A.E.S. Conventions?

This question comes at a time when loyal members of the American Electroplaters' Society and others close to A.E.S., already are making plans to attend the Annual Convention in New York City this July. Some may be questioning whether the expense of going to an A.E.S. convention is justifiable. It is to the latter group that these remarks are directed as well as to employers who are attempting to justify this convention experience as a legitimate company expense item.

Information obtained and exchanged in face-to-face contacts in Educational Sessions and at informal get-togethers is worth more in actual value than might be expected. The experience of attending and taking part in a convention is more rewarding than just reading a paper which has been presented.

Fellow members and non-members from all parts of the world come to share the camaradarie and conviviality that an A.E.S. convention offers not only through its educational and business sessions, but also through a program of fun and entertainment.

New friendships are made and old ones are renewed. It is not uncommon after one or two conventions to come away with at least a dozen or more first-name friends upon whom you can rely when you need assistance.

This is an opportunity to learn first-hand how the A.E.S. functions. Important decisions are made which may influence the future of the Society and the plating indutry as a whole.

An A.E.S. convention is an investment in personal advancement, and in the future of the plating and finishing industries.

George Schore
Convention Chairman

Westinghouse Columbus Appliance Plant Features Automated Processes

WESTINGHOUSE Refrigerators are coming off the assembly line (Fig. 1) in the Columbus plant of the Electric Appliance Division at the rate of two-every-minute. When production lines now planned are in operation, this figure will be increased considerably.

Production at Columbus is geared to this basic concept: the refrigerator must work; it must be salable; and, it must conform to exacting design and manufacturing specifications. This means first of all, that a refrigerator can be no better than the materials from which it is made, and secondly, that it can be no better than the skills of the workmen and the jigs and fixtures they use to fabricate and then assemble the hundreds of parts and components into a complete refrigerator.

Control of quality at Columbus is no idle gesture. All incoming steel is inspected for alloy content, size, tensile strength, hardness, and surface conditions before it is used. During shearing, stamping, forming, punching and drilling operations — inspections for size, depth of emboss, width and squareness of flanges, size and location of various holes, absence of die marks, burrs, dinges, and scratches are made on the first piece plus periodic patrol piece inspection basis.

This same inspection pattern is followed for welding and subassembly operations. It extends to surface finishing, degreasing, rust inhibiting, porcelain enameling, and exter-

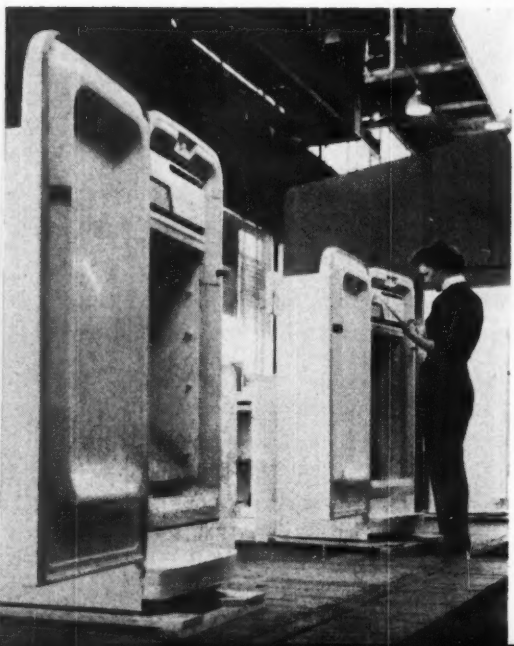


Fig. 1 — Completed refrigerators being given a final inspection before crating for shipment. This inspection makes doubly sure that all accessories are included, that the finish is perfect.

ior organic finishing. Dimensional tolerance checks are made after every manufacturing and fabrication operation to insure the kind of fit that has made mass production the industrial miracle it is. Inspection is thus unrelenting and unyielding in its demands for precision.

Production economics dictate that special manufacturing facilities be provided for the hundreds of parts that go to make up the modern refrigerator. Therefore, what precedes the actual assembly largely determines how smoothly the line runs.

The starting point for all refrigerators at Columbus is the steel storage and shear and press shop area. At this point sheet steel for the outer shell, the inner liner, the door, the many small parts, and electrical sheet steel for the compressor motor are received, inspected, and released to the manufacturing operations.

From here on machines do everything: stamp out 500 compressor motor laminations a minute; coat structural sheet with a drawing compound; shear sheets to size; draw, form, trim, and notch structural sheet into hundreds of small, intricate parts; blank sides, top and bottom of the door frame which are then joined together by welding; form the refrigerator door, then trim and pierce.

From the press shop, all fabricated small parts are moved by trucks and pallets to the production line.

Sub-assemblies, such as the welded refrigerator door and door frame, are moved to the shell and door fabrication and metal finish section by

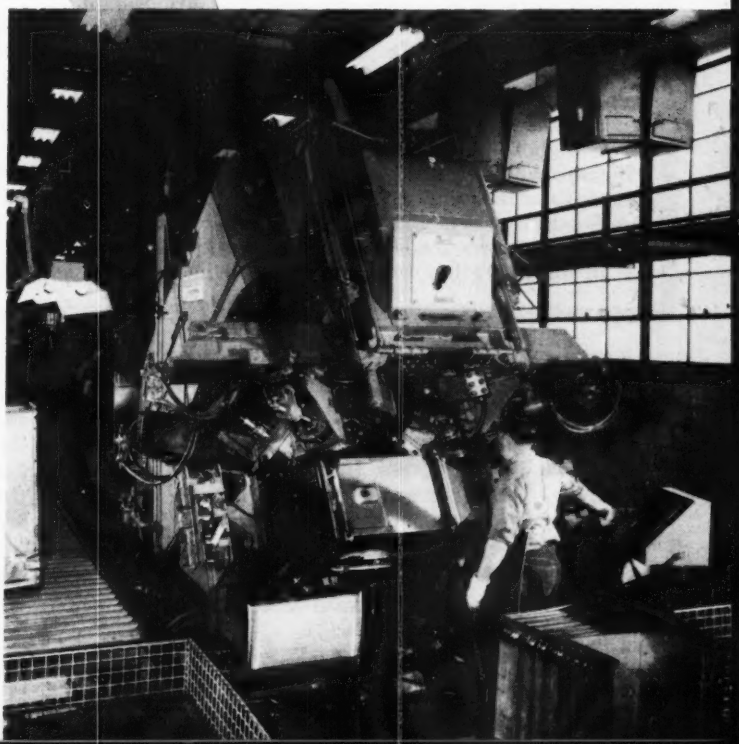


Fig. 2—Food compartments are made by seam welding a stamped sheet metal top piece and bottom piece to a stamped and formed sheet metal skirt or wrapper that makes the sides and back. Welding is sequenced automatically. Finished food compartments are taken to the degreasing and pickling machine by the overhead conveyor seen above the operator's head.

History of the Westinghouse Electric Appliance Division

THROUGH automatic electric home appliances of every kind the name Westinghouse has become most familiar in American homes today.

The Electric Appliance Division headquartered in Mansfield, Ohio, is one of 23 divisions operated by the Westinghouse Electric Corporation. It is composed of four plants:

The East Springfield, Mass., plant which produces refrigeration units, water and beverage coolers, fans, vacuum cleaners, food mixers and food waste disposers.

The Mansfield factory which turns out electric ranges, Laundromats, clothes dryers, refrigerators and home freezers, dishwashers, water heaters and electric housewares.

The Columbus, Ohio, plant which builds refrigeration products.

The Newark, Ohio, plant which stocks all renewal parts for the Electric Appliance Division products.

In the early 1900's, Westinghouse appliances consisted of approximately 10 table appliance items which were made in plants located in East Pittsburgh, Pa., and Newark, N. J.

The East Springfield plant was established in 1915 with production devoted to armaments. First civilian products manufactured there were washing machine and other small motors, automotive equipment (starters and generators) and fans in 1919.

In 1917 Westinghouse purchased the Copeman Electric Stove Company in Flint, Michigan, and began the development and production of the first fully automatic electric range—the model 319-B. Simultaneously, all Westinghouse appliances became the responsibility of the Merchandising Division.

In March, 1918, the Westinghouse Merchandising Division was moved to Mansfield, Ohio, pulling together operations carried on at Flint, East Pittsburgh, Pa., and Newark, N. J.

In 1929, the name Westinghouse Electric Products Company was changed to Westinghouse Electric and Manufacturing Company. The present name—Westinghouse Electric Corporation—was not adopted until 1942 when, at the same time, the Merchandising Division became the Electric Appliance Division.

Though electric irons had been made for many years, the first automatic electric iron was made by Westinghouse in 1924.

In the 1930's the company added refrigerators, water heaters, vacuum clean-

overhead conveyor — there being some 27 miles of overhead and floor conveyers in the plant split into 51 separate systems.

In a separate press and fabrication area, large presses blank and form the tops, bottoms, and skirts for the inner liner or food compartment. These are later welded together in a six-wheel seam welder (Fig. 2). The welded liners move through a metal finish line and are then taken by an overhead conveyor system to the degreasing and pickling machine, and then to the porcelain enamel department.

Scale, rust, oils, soap solutions used in presses, and all foreign matter are removed from the food compartment in the degreasing and pick-

ers, roaster ovens and dishwashers to its line. Laundromat automatic washers were marketed in 1940, making a total of 23 appliances produced by the company.

With the outbreak of World War II, production of home appliances ceased and the Westinghouse appliance plants turned to the manufacture of precision instruments such as binoculars, bomb fuses, tank gun stabilizers, radio transmitters, and depth controls as well as fabricated airplane parts for the Armed Forces.

Shortly after V-E Day, the Electric Appliance Division embarked on an $11,500,000 expansion program that brought its overall production level 50 per cent higher than prewar. It also made possible the manufacture of new postwar products by the Mansfield and East Springfield plants.

In 1946 Westinghouse introduced the first upright home freezer. Other new products added to the company's lines included: automatic clothes dryers, food waste disposers, electric bed coverings, electric griddles, waffle baker and sandwich grill combinations, steam irons, Open Handle dry irons and additions to the vacuum cleaner line.

In 1949 the first fully automatic defrosting refrigerator was introduced.

A renewal parts service depot was established that same year in Newark, Ohio, to service all appliances made by Mansfield. Later, all renewal parts manufactured by the Division's East Springfield plant were concentrated there.

In 1952 Westinghouse ushered in an era of cooking without looking on its model AD-774 electric range with the first automatic surface unit. Shortly thereafter Cook-N-Fryers, dehumidifiers and room air conditioners were produced.

A second wave of postwar expansion for the Electric Appliance Division was initiated with the decision to build a plant in Columbus, Ohio, devoted to refrigeration products. The first refrigerator produced there in November, 1953, marked the debut of the largest plant ever built by Westinghouse.

The vast plant, situated on a 315 acre site, contains approximately 2,000,000 square feet of floor space and at top capacity can produce 4,000 major appliances a day. Its roof covers 45 acres of plant area. The plant contains four manufacturing aisles, each 200 feet wide and extending nearly 1500 feet. These aisles lead in a straight line production pattern to the warehouse area which has a storage capacity of 100,000 major household appliances.

To keep pace with the expansion of manufacturing facilities and additions of new products to its lines, the Electric Appliance Division and its field organization at that time was divided into three product operations—major appliances, portable appliances and refrigeration specialties—with which to better serve its customers now and in the future.

ling machine (Fig. 3) after which a thin coat of nickel is applied to help the enamel adhere to the surface. Following cleaning, a ground coat of porcelain is dip coated on; then reinforced with a spray gun, then dried at 180 deg. F., and finally, fired at 1430 deg. F. The second interior coat is white porcelain enamel which is sprayed on (Fig. 4); dried at 210 deg. F. and fired at 1380 deg. F.

The food compartments are then conveyed to a sub-assembly area where all shelf supports are inserted and speed nuts and tap bars are put in place for attaching the evaporator. The inner liners then move by overhead conveyor to the refrigerator assembly line.

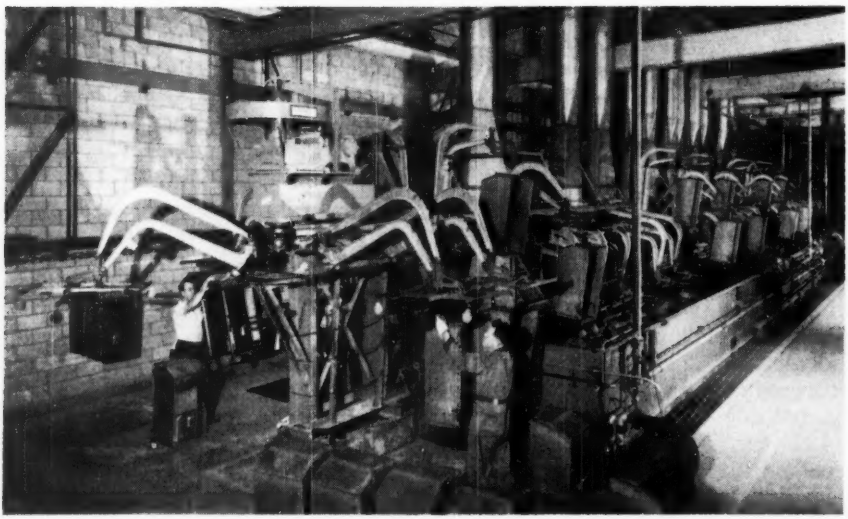
One of the more interesting fabri-

cation operations is that of forming the outer shell for the refrigerator. The shell starts out as a single, flat sheet of steel ranging from 25½ inches wide by 121¾ inches long to 25½ inches by 160⅛ inches long.

The first production step when making an outer shell is to notch and pierce the sheet. There follows in quick succession: flange rolling; then sheet bending to form the sides and top of the shell—the equivalent of an inverted letter "U"; then welding the back sheets, back brace, and reinforcing angles to the shell in a special automatic, multitip spot welder; then forming the bottom flange on the cabinet in a squaring and welding jig and welding the front panel, food compartment gussets, and the door hinge bar to the cabinet; then welding the leveling screws on the cabinet and the bottom pan to the rear panel; then drilling hinge mounting holes; and finally finish grinding and buffing. The completed cabinet is then delivered by belt conveyor to a point where it is transferred to an overhead conveyor that takes it to the phosphatizing tunnel.

The cabinet is first given an alkaline cleaning followed by a double rinse; it is then phosphatized and etched so the paint will adhere better. After the cabinet is dried, the seams are sealed with Benolite—a plastic compound that makes the seams air tight; then transferred to another conveyor that takes the cabinet to the prime coat spray booth; through an oven where the prime coat is baked at 300 deg. F. for 50 minutes; then to the sanding

Fig. 3—This machine carries food compartments through the vats which remove the oils and soap solutions left by presses, and microscopic steel dust or other foreign steel matter. It also coats the compartment with nickel, rinses and dries it preparatory to enameling.



room where every cabinet — and door too (Fig. 5)—is inspected and any foreign particles adhering to the paint are removed by sanding; then to the finish coat spray booth for the final coat of white enamel (Fig. 6); then through the ovens where the final coat is baked at 260 deg. F. for 50 minutes; and then to the storage area at the head of the assembly line.

The Westinghouse refrigerating unit is made up of four basic components: the evaporator, the condenser, the compressor, and the temperature control. In the Frost Free models there is a fifth component: the automatic defrost control. All these basic components are assembled from many separate parts and tested thoroughly.

Assembly of the refrigerator starts by placing a cabinet upright on a wooden frame that serves as a pallet during assembly and a base for the refrigerator shipping case. The cabinet and base are moved along a powered, floor conveyor that is the assembly line. The first actual assembly step is that of spraying the weld seams with a wax coating. The wax coat, applied over the Benolite plastic coat, is double assurance of an air-tight cabinet.

The cabinet is then tipped over on its back and glass wool insulation packed in place. An overhead conveyor that functions as a conveyor and traveling storeroom brings the glass wool from the receiving area. The food compartment liner is then placed in the cabinet and secured to the outer shell. As with the glass wool the food compartment is brought to the assembly line from the porcelain enameling area by an overhead conveyor.

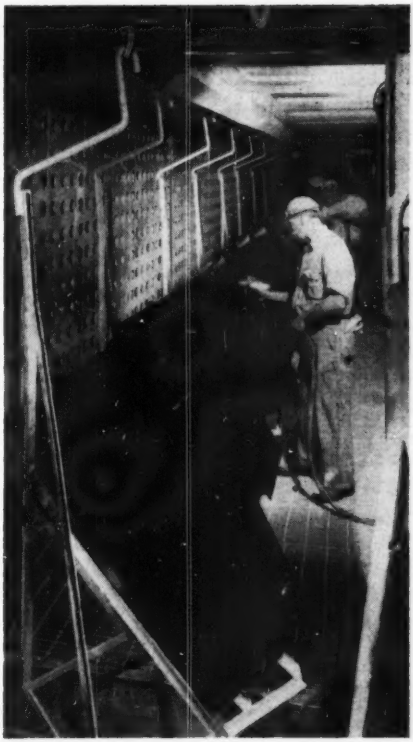


Fig. 4—The white finish coat of titanium acid resistant porcelain enamel is sprayed on the inside surface of the food liner in the specially ventilated spray booth. From here the compartments go through a dryer, then the corners are rimmed to prevent chipping, and then through the furnace where the porcelain enamel is fired on at 1380 deg. F.

The cabinet is then raised to an upright position and the refrigerating unit installed. Once again a conveyor is used to connect the refrigerating unit assembly area with the refrigerator assembly line. With the unit in place, glass wool is packed

into the bottom of the cabinet to deaden the noise of the compressor and the evaporator tube openings in the cabinet are sealed with a mastic. Then finally, the door frame trim mouldings are attached and the refrigerating unit control and the food compartment light switch attached to the trim and the cabinet is again tipped over on its back.

Next comes the toughest test of all—the cabinet leak test (Fig. 7). A test panel that looks like a refrigerator door in traction is placed over the door opening of the cabinet and a vacuum pulled on the box. The cabinet must hold a 4-inch vacuum pulled for a given period of time if it is to pass water muster for not less than 6 seconds. A light flashes to show the cabinet passed the test.

Following the leak test the cabinet is again raised to an upright position and the fan cover installed. Next come brackets to hold the cabinet firmly in place on its base during shipping. Then the door is attached to the box.

The control dial is then put in and the refrigerating unit connected to a traveling electric outlet and run for 10 minutes to be sure the unit operates satisfactorily. The refrigerator is then cleaned inside and out, the accessories placed in the cabinet, and the electric system ground tested and the control continuity tested.

Then comes the tunnel of light where the exterior finish is examined very carefully to be sure there aren't any blemishes in the finish paint coat or any dinges or scratches in the cabinet shell. Any imperfections in finish are corrected upon emergence from the tunnel of light. Final inspection follows, then crating.

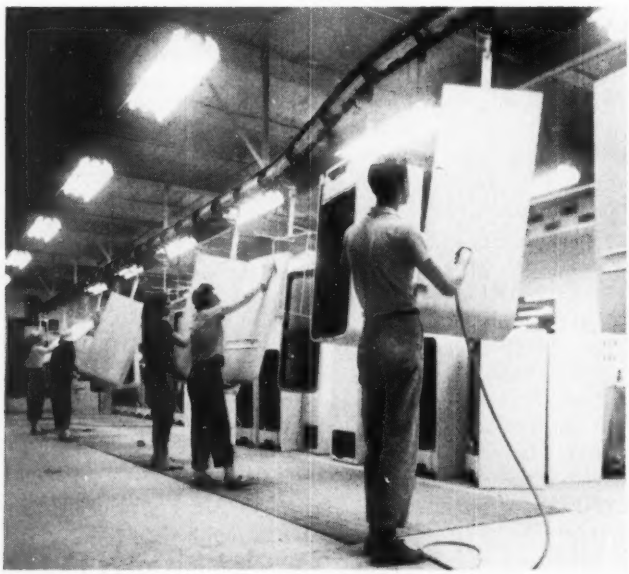


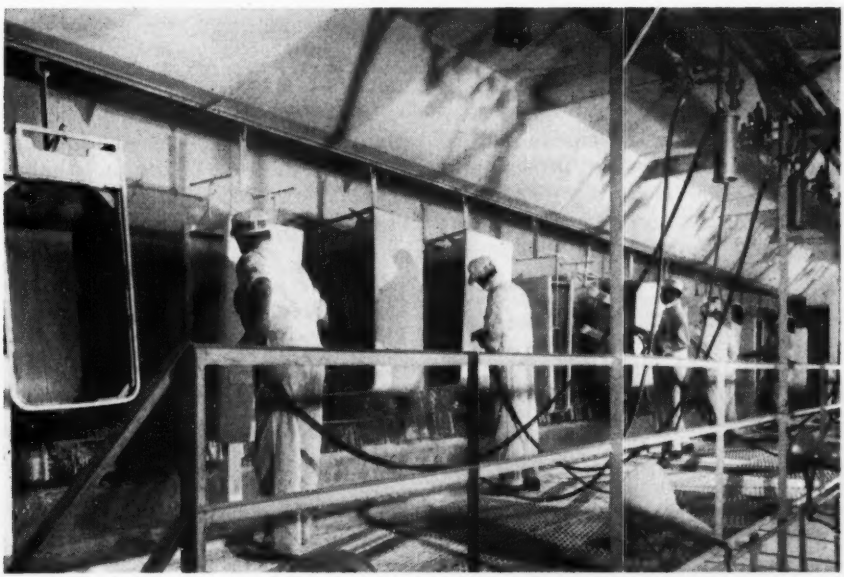
Fig. 5 — Cabinets and doors are inspected and any blemishes or foreign particles in the prime coat of paint are sanded down by hand. Dust from the sanding operation is removed by wiping with a specially prepared "tack-cloth" and blowing with air before the finish coat of white enamel is sprayed on.

A great deal of research has gone into the packaging of refrigerators. As a result damage in transit has been reduced to less than 1 per cent on packaging and 0.7 per cent on the product. This is a fine compliment to engineered packaging and better packing materials and methods—all of which are in use here.

The refrigerators are identified by stenciling the model, style, and serial number on the outside of the crate. After that, they are moved to the warehouse where they are segregated and stored temporarily or moved to areas on the shipping platform from which they can be picked up by lift truck and loaded into freight cars. There is capacity in the warehouse for 90,000 appliances.

That is the story of refrigerator production at Columbus — a plant where only superlatives apply: Nearly two million square feet of manufacturing area that houses 2613 production tools; more than two miles of roads and driveways outside the plant serve 41 truck loading and unloading docks; nearly four miles of railroad track with eight loading and unloading platforms that can provide for 49 cars simultaneously; 60 carloads of raw material received daily and 90 carloads of finished products shipped; 27 miles of overhead monorail conveyors and floor conveyors that are split into 51 separate conveyor sys-

Fig. 6—Cabinets and doors are given their final coat of white paint in this water wash spray booth. The paint is piped from the paint mix room and is circulated through the system continuously 24 hours a day, 7 days a week. From here, parts go through an oven where the paint is baked on at 260 deg. F. for 50 minutes.



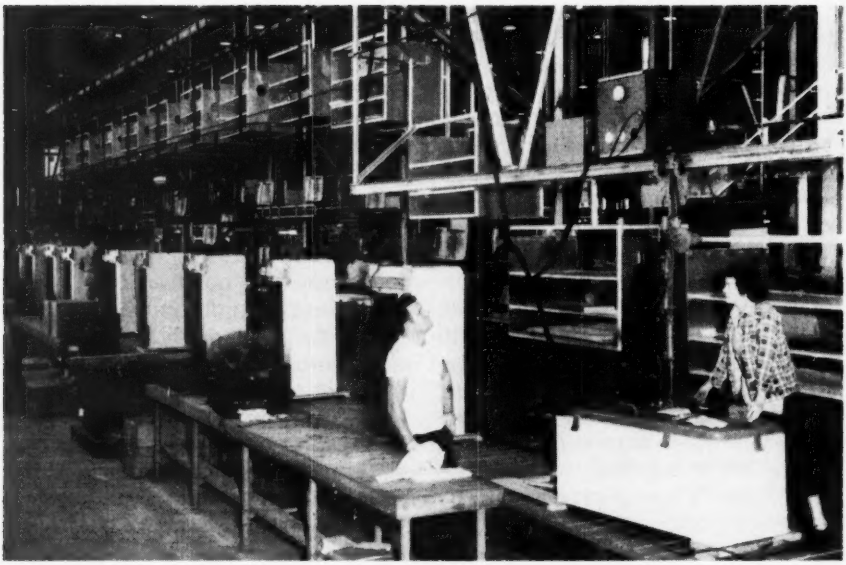
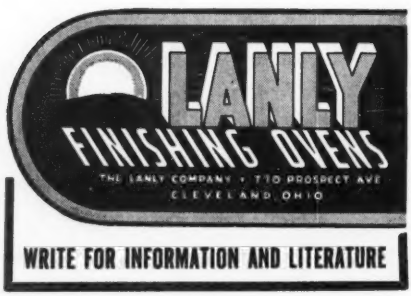


Fig. 7—A good refrigerator cabinet does not leak air or moisture. To be sure that Westinghouse cabinets are properly sealed, each one is given a leak test. A test panel that looks very much like a standard refrigerator door in traction is placed over the cabinet door opening. When properly sealed, a 4-inch water vacuum is pulled. This must be held to pass inspection.

(Photos courtesy Westinghouse Electric Corp., Pittsburgh 30, Pa.)

tems; 65 electric lift trucks and 18 electric walking pallet trucks; and nearly 15,000 lighting fixtures. These facilities and services — when integrated — make the Columbus plant an extremely efficient production unit in spite of the fact that it is 2172 feet from one end to the other and 882 feet across.



FACT FILE OF METAL SPECIALTIES. An illustrated leaflet designated as "Fact File of Better-Built, Longer Lasting Metal Specialties," is being distributed by **Allied Metal Specialties, Inc.,** Box 235, Hampden Sta., Baltimore 11, Maryland.

Shown in the illustrated bulletin are trays, racks, fixtures, crates, baskets, tanks, and specialty items supplied by the company. For each type of product the type of metal from which that product is constructed is specified and suggested uses for the product are included.

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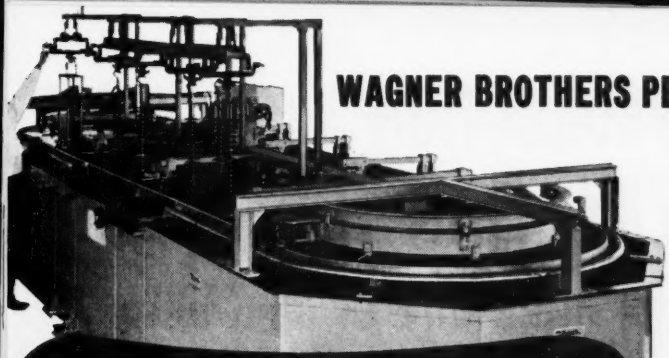

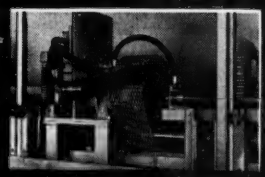

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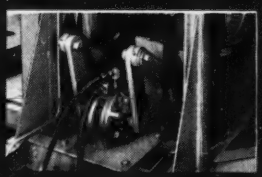

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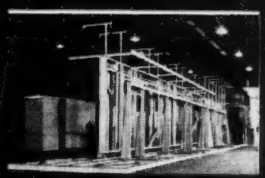
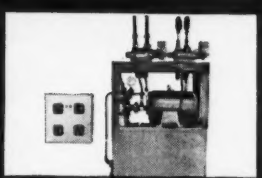


RACK MECHANISM



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*Facts from Egyptian New Product Field Report

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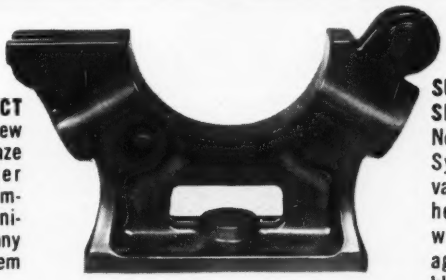

GREATER IMPACT RESISTANCE* New Egyptian 700 Glaze showed greater resistance to impact and mechanical abuse than any comparable system tried.

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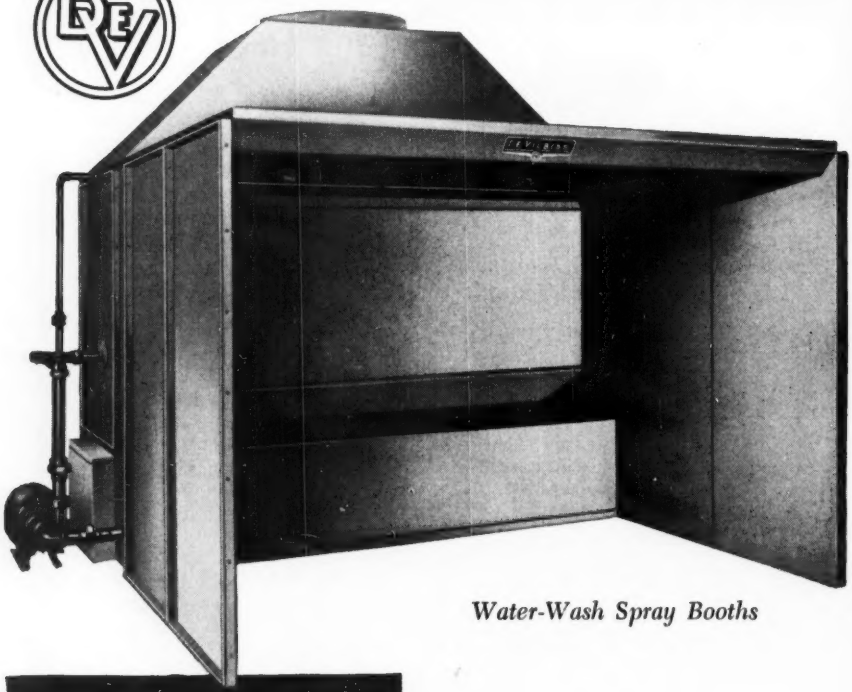
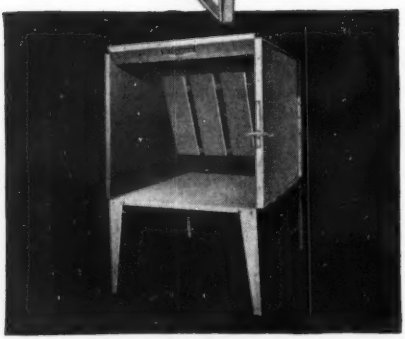
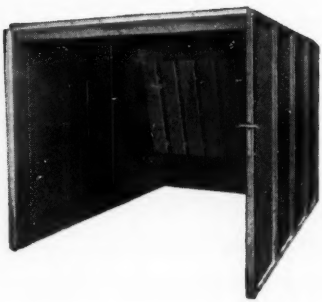


Water-Wash Spray Booths



Leg-Type (also Bench-Type) Spray Booths



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How to Finish by Vacuum

By J. GORDON SEITER

Manager, Vacuum Metallizing Department
F. J. Stokes Machine Company, Philadelphia, Pa.

J. Gordon Seiter (above) discussed "Vacuum Metallizing" at the First Annual Tri-State Regional Meeting, American Electroplaters' Society, held April 3 in Cincinnati.

(PRODUCTS FINISHING Staff Photo)

Fig. 1—A number of products finished by vacuum metallizing.

TOY trains, tail lights, bicycle horns, costume jewelry, radio cabinets, and radiator grilles are being finished by vacuum metallizing these days.

Although the process is not a recent discovery, it is only with the development of efficient, high-speed diffusion vacuum pumps and effective air-tight vacuum chambers that it has been transformed from an essentially laboratory-scale process to a practical and profitable method of industrial finishing. These developments and accompanying refinements in vacuum processing techniques have brought vacuum metallizing to a point at which it is now accepted as one of the standard methods of depositing metallic coatings.

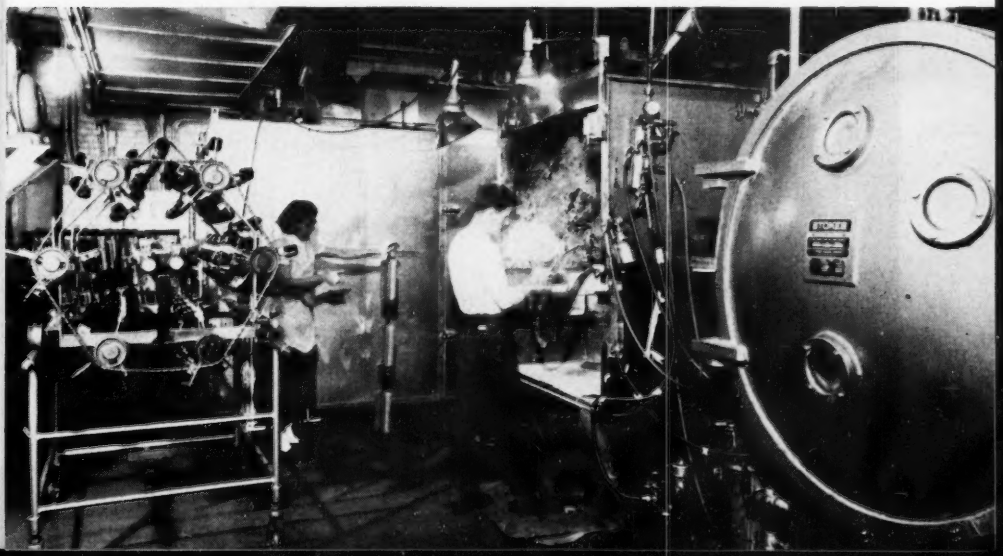
Vacuum metallizing should not be confused with vacuum sputtering or with vacuum spraying under mechanical or thermal impulse. It is true vaporization of metal or metallic salts in an extremely high vacuum. Under these conditions, the metal or salt is transformed to mole-

Metal Products Metallizing

cular particles which, in the absence of any restraining molecules of air, are free to move about at will. The characteristic movement of such unrestrained molecules is outward from the source in all directions in straight lines until they come in contact with a facing surface, whereupon they condense and coat that object.

The process is now used to coat both metal parts and all kinds of non-metallic materials. In fact, vacuum metallizing is used to coat nonconductive materials so that they can subsequently be electroplated. This discussion, however, will be limited to coating metal products by

Fig. 2--Prior to metallizing, parts are shown being sprayed with a lacquer coating in the A. C. Gilbert Co. plant, New Haven, Conn.



the vacuum process.

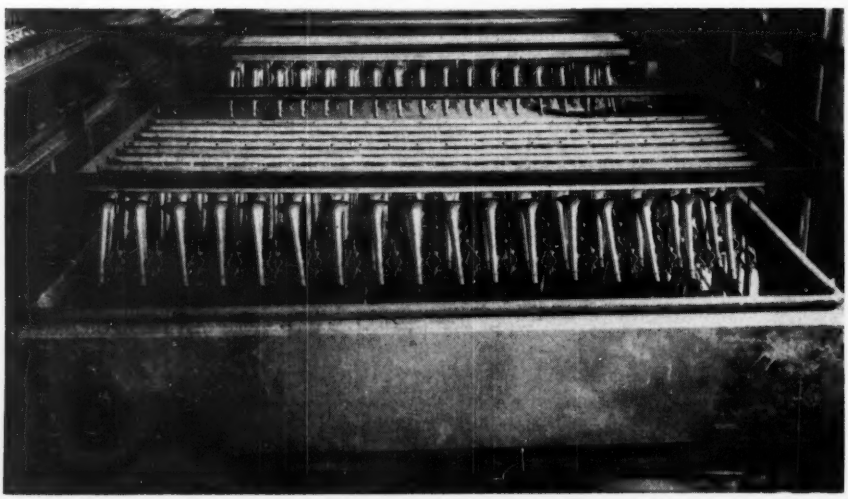
For decorative work, vacuum metallizing gives a smooth, tightly adhering coat that will not tarnish, has a brilliant lustre, and is highly reflective. Such a coating may be left the natural color of the metal deposited, or it can be given any other desired color by dyeing the protective coat of lacquer applied subsequent to the metallizing.

Coatings deposited by the vacuum process may also possess valuable functional properties. They may be made to reflect, to partially reflect, or to partially transmit, light and heat waves; they may be designed to conduct electric current; or they may act as a moisture barrier.

Vacuum metallized metal products are now utilized in the automotive industry—for name plates, ornaments, handles, knobs, trim, tail lights, reflectors, and even radiator grilles—in fact, wherever the parts are not likely to be subjected to bumps, shocks, or severe abrasion. Developments in protective lacquers for parts to be exposed to the weather have now progressed to the point at which vacuum metallized surfaces on zinc die castings have withstood 800 hours of salt spray without deterioration.

In general, vacuum metallizing is well suited for any type of part ordinarily made of die castings or steel stampings. Such products as lighting fixtures; hardware items like doorknobs, drawer pulls, and switch plates; plumbing fixture handles; figurines, sports trophies and religious articles; toy trains, cap pistols, and bicycle horns; can openers,

Fig. 3—Zinc base die cast horns manufactured by Yoder Mfg. Co., Little Rock, Ark., are dipped in lacquer prior to vacuum metallizing. The lacquer dip tank is raised by a hydraulic jack until the lacquer completely covers the horns, then is lowered very slowly so that the lacquer coating is uniform and free from runs. This is an essential step in the process.



escutcheons and name plates for household appliances, and sculptured placques—these are all being successfully finished today by vacuum metallizing.

How It's Done

The objects to be metallized are first cleaned, and then given a light phosphate coating, which may be either sprayed, dipped, or brushed on. This coating, while not absolutely essential, is recommended for quality plating. It provides a rust proof protection and, more important, produces a roughening of the surface of the base metal which promotes a good bond between it and the coat of lacquer which is next to be applied. The phosphate coating should not be too heavy or it will leave a "pebbly" surface even after lacquering, which will then be faithfully duplicated in the final metallized surface.

The phosphated pieces are next given a thin coat of lacquer, applied either by spraying (Fig. 2) or dipping (Fig. 3). This is one of the significant modern refinements of the vacuum metallizing technique and contributes a great deal to the satisfactory results which can now be obtained. Lacquering accomplishes two important purposes. It provides a smooth undercoat for the metallic deposit, filling in and obliterating any tiny cracks, scratches, or visible blemishes, and thus producing a smooth high gloss surface in the finished product. It also seals the pores and reduces gassing from the base material — especially important when the base material is slush metal or lead base castings which are likely to be very porous. In the latter purpose the lacquer coating serves a very useful function by shortening the pump down time required to evacuate the metallizing chamber, and thus quickening the production cycle.

Spraying should be done in a spray booth and in a dust free area, to prevent the part from picking up any dust particles, as these will ultimately detract from the glossy surface of the metallized product.

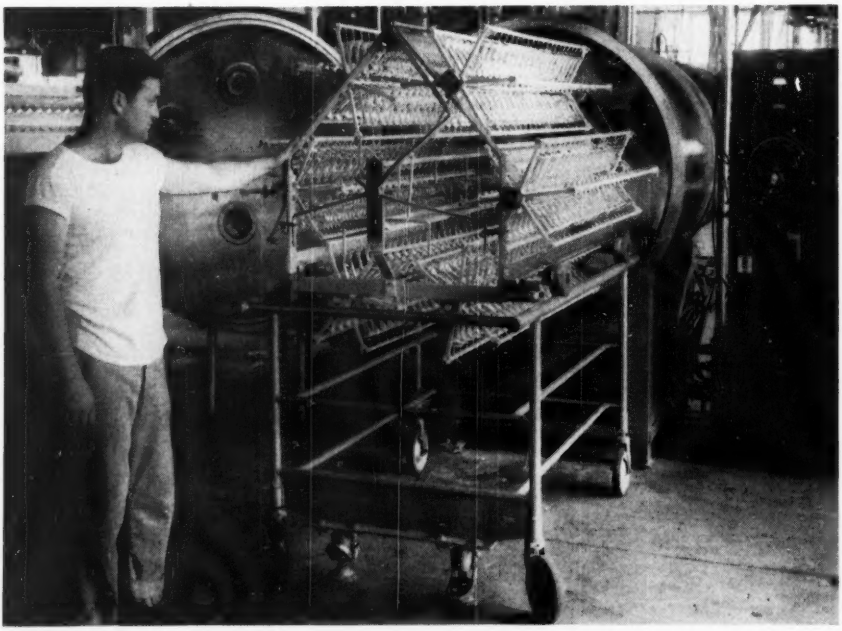
Fig. 4 — Lacquer dipped horns are loaded onto racks and baked for 35 minutes.

For lacquering metal parts, synthetic resins which are "cured" by baking at 300 deg. F. for about 20 minutes (Fig. 4) are recommended coating materials.

The pieces to be metallized are then arranged on racks which hold them in the proper position with respect to the metal source from which the metal molecules are dispersed. Where the surfaces to be coated are intricate or involve multiple planes, the rack is designed to rotate the parts during the vaporization period so that all of the desired surfaces are brought into the "line of fire." Such is the nature of the radiation of the vaporizing metal, however, that the parts can be spaced fairly close together and large quantities of pieces can be metallized in one cycle.

The loaded racks are then moved into the vacuum chamber, the door is closed, and a high vacuum is drawn. For most products, drawing the vacuum is itself sufficient to take care of out-gassing and moisture-removal from the pieces to be coated. The parts are ready for metallizing when the pressure in the cham-

Fig. 5—After the lacquer coat has been fully cured in the baking cycle (Fig. 4), the horns are loaded onto the "spiders" of the metallizing unit. The chain drive rotates these spiders during the flashing period when the aluminum is being vaporized so that all parts of the horns are brought into the line of fire and are coated with their full share of metal. The filaments on which the aluminum is hung can be seen in the center of the rack of six spiders, running longitudinally through the chamber. The illustration shows a completed rack being removed from the chamber after metallizing.



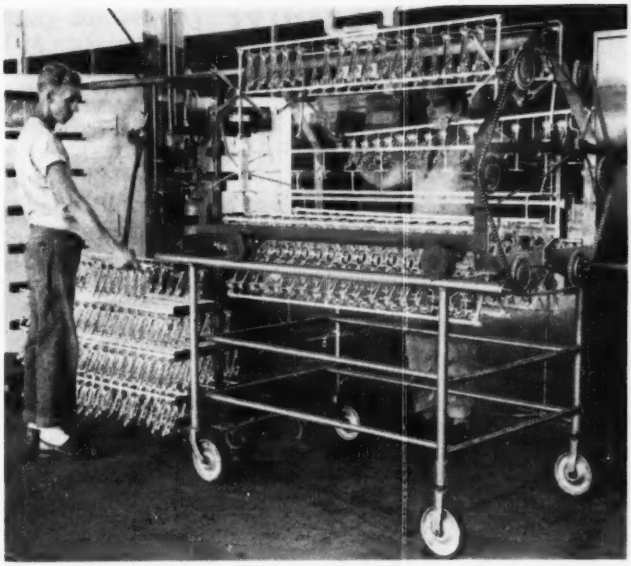


Fig. 6 — Metallized horns are unloaded from the rack and given a second lacquer dip which, like the first, is then baked for 35 minutes. The hard, tough coating protects the brilliant and lustrous metallic finish.

(Photos courtesy F. J. Stokes Machine Co., Philadelphia, Pa.)

●

ber has been reduced to 0.5 micron or lower.

Since the vaporizing or metallizing period is a very brief portion of the complete cycle, production rates are largely determined by the speed with which this vacuum is reached. High capacity vacuum pumping systems are now available which assure rapid pump-down of the chamber. Rough pumping with a mechanical vacuum pump takes about three minutes; then the booster pump is cut in and within another minute brings the pressure down to 100 microns or less; then the diffusion pump is cut in and within another three minutes brings the pressure down to 0.5 micron. (These times are for pumping down the empty chamber when clean and dry; cycles for loaded chambers will be about double these times.

While the pressure is being reduced the metal to be vaporized is being electrically heated. Where this metal is aluminum (the one most frequently used in vacuum metallizing) the recommended technique is to use small aluminum staples which are hung from a suitable array of coils of stranded tungsten wire filaments placed in proper position to give the desired thorough dispersion of vaporized metal ions. The filaments are connected to a source of electric current by means of filament holders attached to two electrodes which run lengthwise through the vacuum chamber.

As the vacuum is being drawn, the filaments are preheated to drive off gases and any moisture that may be present and to allow for expansion. This is a step which contributes considerably to prolonging the life of the filaments. Where proper procedures like this are followed, filaments may last 10 to 15 cycles.

When the pressure has been reduced to below 1 micron, the fila-

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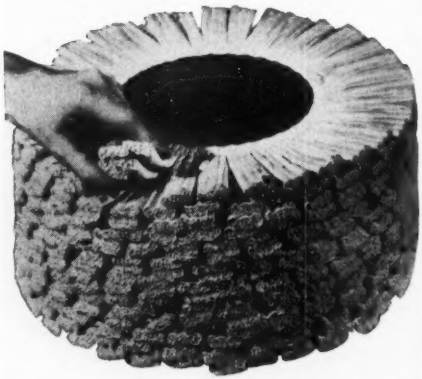

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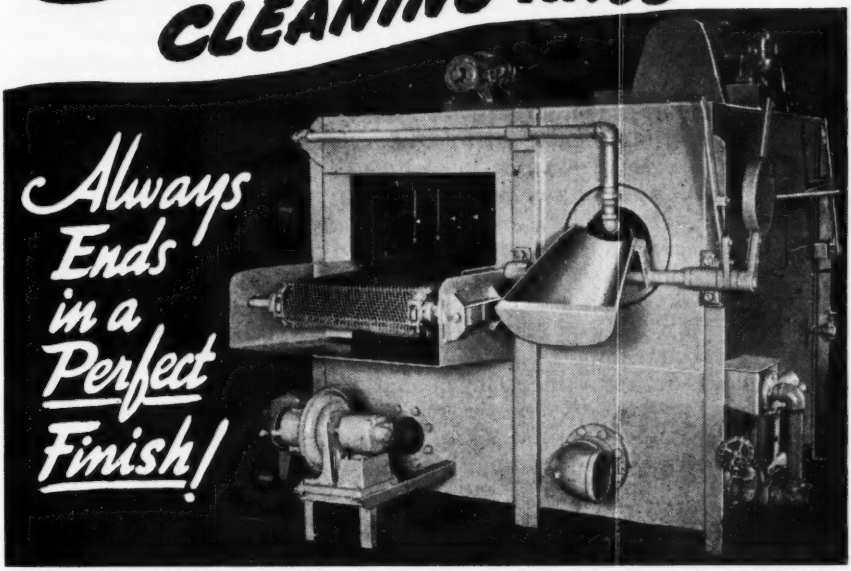
ments are gradually raised to incandescence at 1200 deg. F. At this temperature, which is the melting point of aluminum in a vacuum, the aluminum staples melt and spread over the strands of tungsten, giving a large surface area, well distributed, from which the metal can evaporate. In its molten state, the metal acts as a "getter" to absorb gases and thus contributes to the production of an even better vacuum.

Now the temperature is raised rapidly to 1800 deg. F. At this point, evaporation of the aluminum takes place, a phenomenon which is exciting to watch and amply deserves the description, "flashing the filaments." The aluminum vaporizes and takes flight in molecular form in a very short time—about 5 to 10 seconds—and is deposited on the pieces in the racks and on the inner wall of the vacuum chamber. It gives all the surfaces it reaches a coating of glistening metal, thin but uniform, and of perfect fidelity to the surface of the object to be coated.

Metals or metallic salts which cannot be hung from filaments are usually placed in "boats" or trough-shaped crucibles formed from graphite, tungsten or molybdenum and running longitudinally through the vacuum chamber. The "boat" is fastened at each end to the electrical leads. As the current is applied, the "boat" becomes incandescent and melts the metal or metallic salts contained in it. This setup provides a large surface area of molten metal for evaporation, which is desirable for coating parts that require the deposit of a relatively large amount of metal. It is also the arrangement best suited for the continuous metal-

"SIAMESE TWIN" CLEANING RACE



ENGINEERED by A-F to clean cutting oil from small parts and the metal boxes in which they are conveyed, this A-F "Duo-Cleaning" Machine was built in the form of a "Siamese Twin"—with both the A-F Rotary Drum Unit and Wire Mesh Conveyor Unit in the same housing so as to use the same set of pumps and the same supply tank.

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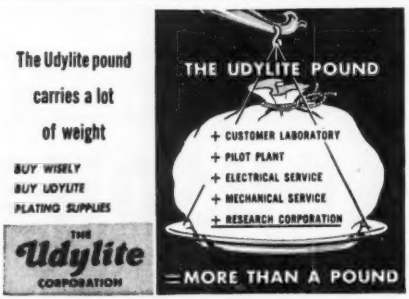
lizing of sheet stock in rolls.

The total time for the metallizing cycle ranges from 10 to 25 minutes, depending on the material of the pieces being coated and the time required for out-gassing it and stabilizing the lacquer.

After metallizing, the parts are removed from the chamber (Fig. 5) and, when necessary, given a final coat of a compatible lacquer to protect the metal coating from abrasion (Fig. 6). A thickness of 2 or 3 mils is usually perfectly adequate for this purpose, and gives a very durable layer of protection.

Aluminum deposited under vacuum will give a brilliant, chrome-like tarnish-proof finish. Where this silvery color is desired, clear lacquer is used for the protective coating; where other metallic colors are wanted, the lacquer may be dyed to give a gold, brass, copper, red, blue, amber, or other hue.

This is the metallizing procedure for metal products in the basic form. There are, of course, many minor refinements of the technique which can best be worked out by consultation between the product-finisher and the experienced engineers of companies supplying the vacuum processing equipment.



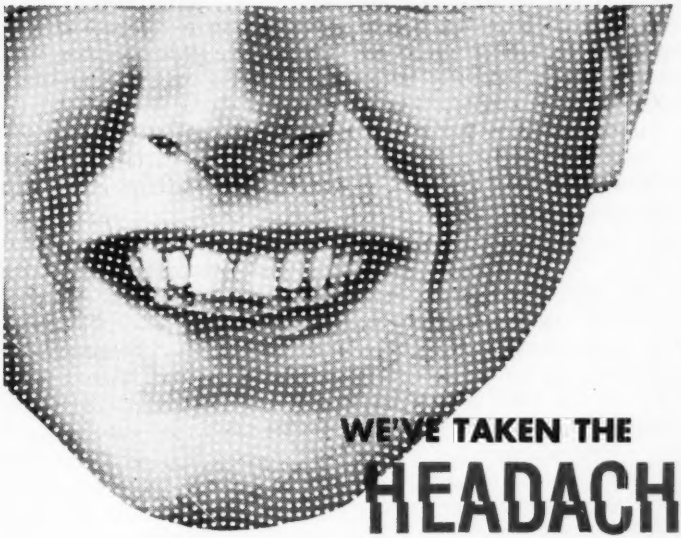
Finish Characteristics

The metal coating deposited by the vacuum process is quite thin, normally ranging from one to ten millionths of an inch and seldom exceeding five millionths of an inch. While thickness of the deposit is not critical in most product-finishing applications, it can be accurately controlled to within one ten-millionth of an inch. The method of controlling the thickness is to limit the time during which the electric current heating the filaments is high enough to hold the temperature at the point of vaporization of the metal being deposited. As mentioned above, the normal length of time for this step in the process is five to ten seconds, but it can safely be prolonged for an additional few seconds. This will increase the thickness of the deposit up to the practical maximum of about 10 millionths of an inch.

An aluminum film of less than three millionths of an inch will completely conceal the color of the base material of the coated object. This permits the manufacturer to design his product around base materials that are relatively inexpensive and, by giving them a quality finish by vacuum metallizing, obtain a very attractive end product.

The vacuum metallized finish is brilliant, smooth, and highly reflective without any subsequent polishing and buffing. This finish will not tarnish and remains bright and unaffected by aging. Corrosion resistance of vacuum metallized products is very high due to the continuous, unbroken film which is formed by the deposit of molecular metal unimpeded by any interfering medium.

The highly reflective finish which



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We'll gladly send you a set of Fosbonded test panels, or Fosbond chemicals with which you can prepare your own panels. Just tell us 1) type metal to be phosphatized, 2) phosphate coating now used, 3) method of application, 4) organic finish used, 5) standards finish must meet.

Or, give us details about your operation, and we shall answer your questions about Fosbond as specifically as possible. Write: Customer Service Dept., Pennsylvania Salt Mfg. Co., 511 Widener Bldg., Phila. 7, Pa.

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is obtained makes vacuum metallizing an attractive method of coating reflectors for such items as lighting fixtures, flashlights, and the inner surface of TV tubes and infra-red lamps.

Coating Metals Used

Practically any metal and many metallic salts can be deposited by the vacuum process.

For decorative finishes, aluminum is the most commonly used metal. This is because it is the most easily vaporized, evaporating at the relatively low temperature of 1800 deg. F. under vacuum conditions; gives the same brilliant, chrome-like color as polished platinum, rhodium, or chromium; does not tarnish, even when it has not been lacquered; and is much cheaper, of course, than other materials. An aluminum deposit can be protected against abrasion by applying a topcoat of lacquer. By dyeing this lacquer coat the metal can be made to simulate any desired metallic color.

Where the product requires the pure metal coating rather than the simulated color, gold and silver can be readily applied by vacuum metallizing. Platinum, tungsten, tantalum, and molybdenum can also be evaporated and deposited by this process, but with greater difficulty. Nickel and chromium are sometimes used despite the much higher temperature required to vaporize them. Since nickel and chromium react with the tungsten filaments and thus produce an impure metallic radiation, the procedure usually followed when nickel or chromium must be deposited is first to electroplate the filaments with a quantity of the desired metal and then vaporize this under vacuum.

Besides pure metals and alloys, many metallic salts are used as coating materials, for the production of low reflective surfaces on lenses, sunglasses, and other products.

While vacuum metallizing is not the universal process, the method should be definitely considered whenever metallic coatings are needed on any exterior surface, and the product-finisher should consult with the experienced engineers of manufacturers of vacuum metallizing equipment to evaluate the applicability and economy of the process. Some of these manufacturers offer a "free sample" service, to encourage the potential user to make this evaluation of the application he has in mind. As a result many new uses for vacuum metallizing are being discovered every day.

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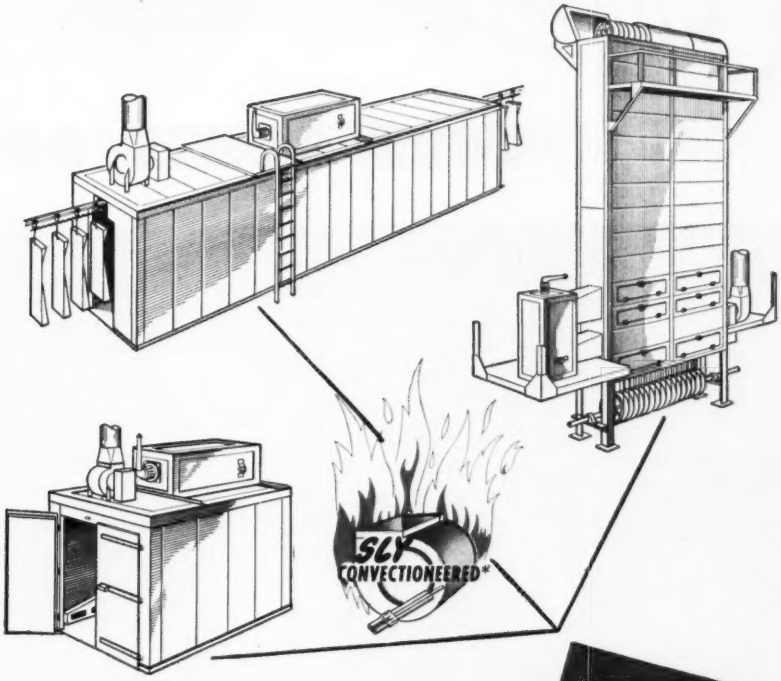

The solutions to your Industrial Oven and process heating problems can be found in this bulletin.

Your inquiries are solicited whether your requirements are for simple ovens or large complicated continuous systems.

For your copy of Bulletin 200 write or call.

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Chandeysson

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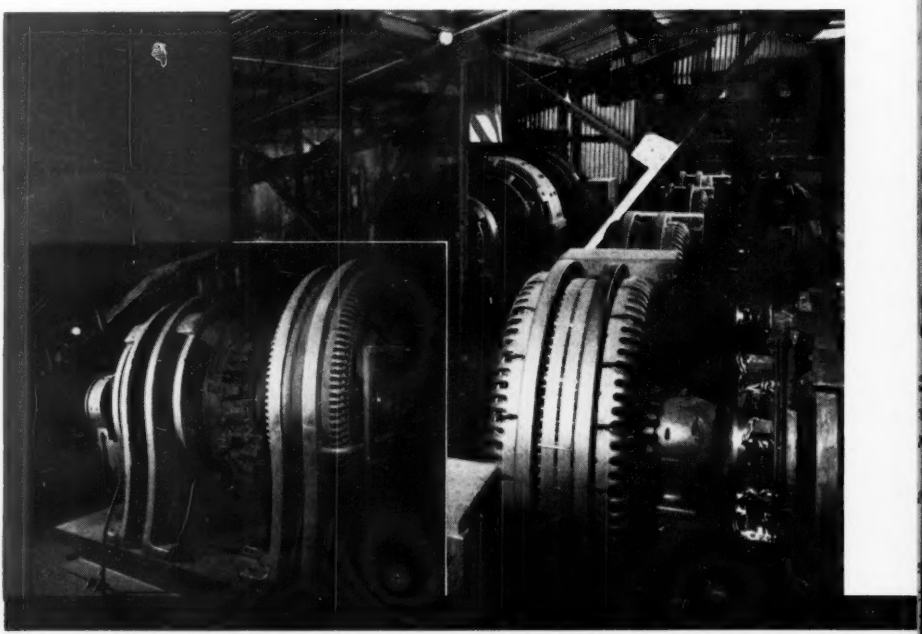

14 volt, 10,000 ampere Chandeysson motor generator set as installed at United States Spring & Bumper Company.

Five Chandeysson motor generator sets are in daily service at the United States Spring & Bumper Company, 4951 Alcoa Avenue, Los Angeles, California.

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Bulletin D-102 contains data and specifications on Chandeysson machines. If you are interested in power savings and power dependability, it will pay you to read this bulletin. Your copy sent promptly, and without obligation.

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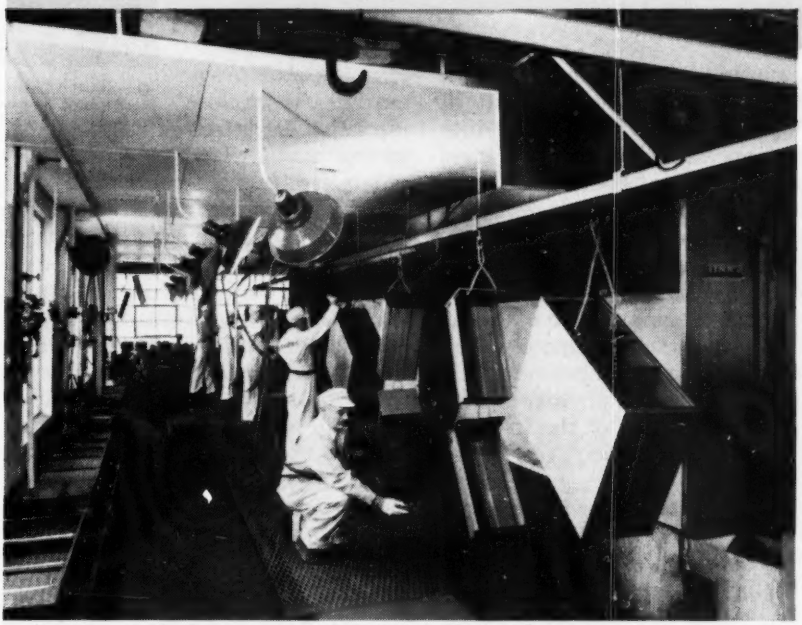

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Propeller Blades Zinc

By CHARLES B. CONWELL, and CHARLES J. STANSFIELD

Hamilton Standard, Division of
United Aircraft Corp.,
Windsor Locks, Conn.

Charles J. Stansfield, Design and Methods, Production Engineering Dept.

AN automatic conveyor, with the highest vertical lift in the world, has gone into operation zinc plating steel propeller blades at Hamilton Standard, division of United Aircraft Corporation, Windsor Locks, Conn. Features of the installation are the production of more consistent deposits with the return-type machine, increasing productive capacity, and speeding up plating substantially.

Along with the high lift, special engineering features of the installation include recycling of blades through the zinc plating tank and the automatic transfer of blades from and back to the plating conveyor, delayed set-down of blades over certain tanks, automatic by-passing of selected tanks, hydraulically-operated elevator lift, simplified solution control, system for conserving water in spray-rinse tanks, and specially designed equipment for handling the long propeller blades.

Process Outline

During operation, blades are placed on a H-VW-M elevator-type plating conveyor at the loading station (Fig. 1). Blades are then automatically carried through a series of cleaning and preparation baths, being lifted 10½ feet in the air as they are moved from bath to bath. Blades may be loaded on the conveyor at any time — balancing or spacing of loads is unnecessary.

Cleaning is followed by immersion in a zinc plating bath (Fig. 4). After rinsing, blades either return to the loading station to be taken off the conveyor or they transfer to a monorail conveyor for recycling through the zinc plating bath (Fig. 5). The transfer mechanism is selective in that it only transfers blades designated for recycling.

"Recycle" blades are inspected, sandpapered and scrubbed down on the monorail conveyor before being returned to the plating conveyor. They may be returned at the midpoint of the zinc plating tank for half a run through the bath, or at the end of the tank for a full recycle.

Plating is a vital step in the fabrication of hollow steel propellor blades. It is done to protect the steel surface, and to provide properly distributed weight for the fine balance required for aircraft propellers.

Plated Automatically

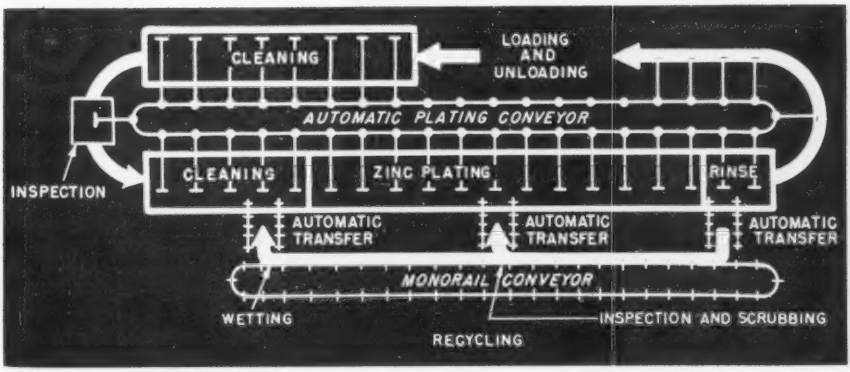
Charles B. Conwell, Supervisor Production Engineering Dept.

Plating for balance, which is a relatively new application of electroplating, is the principal reason for the recycling operation. The thickness of deposit that effects the balance is determined before blades reach the plating installation. To put on the desired deposit blades are recycled through the zinc bath from two to as many as six times.

The plating cycle is as follows:

1. Spray rinse for 3 minutes.
2. Reverse current alkaline cleaner, 3 minutes.
3. Same as No. 2.
4. Spray rinse, 3 minutes.
5. Muriatic acid bath, 3 min.
6. Spray rinse, 3 minutes.
7. Scrubbing and inspection.
8. Muriatic acid bath, 2 minutes 40 seconds.
9. Spray rinse, 3 minutes.
10. Sulfuric acid, 3 minutes.
11. Water rinse, 3 minutes.

Fig. 1—Layout of Plating Installation. Propeller blades are placed on the plating conveyor at the loading station, then cleaned, zinc plated and rinsed. After rinsing, blades to be recycled are automatically transferred to the monorail conveyor; finished blades pass on to the unloading station. "Recycle" blades are inspected, scrubbed down and wetted before being placed back on the plating conveyor. They may be given a full or a half recycle.



12. Spray rinse, 3 minutes.
13. Zinc plating, 47 minutes. The rubber-lined tank contains 72 78-inch, 75-pound cast zinc anodes that are removed once a week for cleaning.
14. Rinse, 3 minutes.
15. Rinse, 3 minutes.

Blades travel an oval course of about 160 feet around the perimeter of the automatic plating machine. It takes a blade 135 minutes to make a complete cycle on the machine. The blade's time may be increased to as much as 370 minutes when additional plating is required.

A 12 volt, 10,000 ampere motor-generator set furnishes power for zinc plating (Fig. 7). A generator of the same type, rated at six volts, 3000 ampere capacity, provides power for electrolytic cleaning.

Special Problems Had To Be Solved

When the decision to plate automatically was made, problems involving equipment design, layout, engineering and ultimately operation arose, and had to be solved.

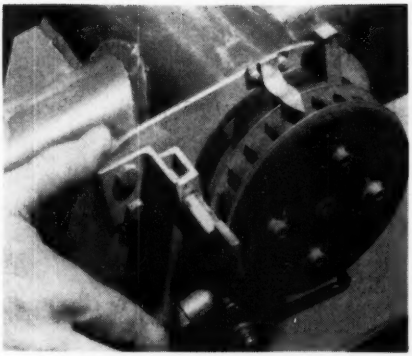


Fig. 3—Operator sets the indexing counter for the recycling operation. After recycling the pre-set number of times the lever at the top right is sprung and the blade automatically bypasses the transfer mechanism.

1. Handling A Bulky Product.

The steel propeller blades made by Hamilton Standard, which is the world's largest manufacturer of aircraft propellers and aviation equipment, are intended for use with high-powered engines. Their lengths range from about four to seven-

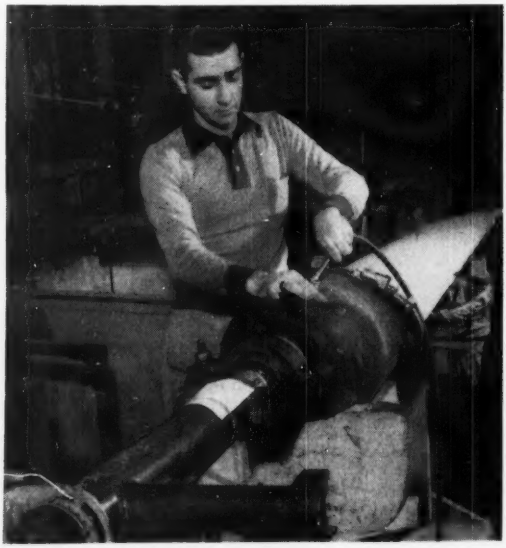


Fig. 2 — After attaching the blade to this T-bar carrying fixture, the operator inflates the rubber boot covering a section of the blade. The section, called the fairing, is made of hard rubber and has to be protected from rinsing, cleaning and plating solutions. Any leaks in the boot may be easily detected by observing the escape of the air or the collapse of the rubber.

and-half feet. The larger blades, with their holding fixtures, weigh over 200 pounds. Automatic plating necessarily requires vertical tanks, and a heavy and high lift.

Solution

Job requirements were set down by Hamilton Standard production engineers, and Hanson-Van Winkle-Munning Co., Matawan, N. J., engineered, built and supplied the plating equipment for the installation. The key item, the plating machine, is an adaptation of the standard H-VW-M elevator-type conveyor.

Unlike the standard conveyor, the elevator lift on this machine is hydraulically operated to handle the big blades. Carrier arms have a special, two-pronged hook on the end.

This hook supports a T-bar fixture attached to the end or raceways of the propeller blade (Fig. 2). The T-bar fits into the carrier's two-pronged hook. The conveyor handles 12 blades at once in the main plating tank and has carrier arms available for any number up to 25 blades at other stages in the processing.

2. How To Provide Automatic Recycling.

To recycle work automatically through a plating bath two problems must be solved: (1) how to transfer unfinished work from the plating conveyor to the recycling conveyor, and vice versa; (2) how to block transfer of finished work from the plating conveyor.

Solution

The transfer mechanisms designed by H-VW-M for this operation are located at the middle and at each end of the zinc plating tank (Fig. 1). Components of the mechanism are two sprocket-driven chains about 5 feet long, and limit switches for starting and stopping the transfer. A mechanical indexing counter on the T-bar fixture controls the transfer movement (Fig. 3).

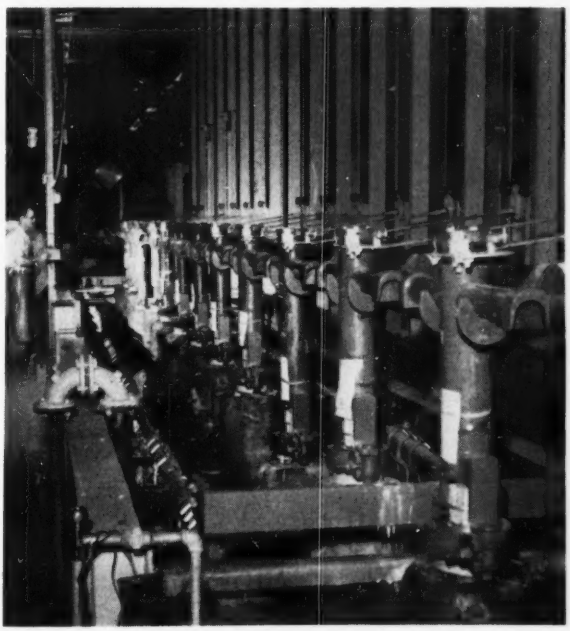


Fig. 4—After a blade is placed on the oval-shaped, H-VW-M elevator-type conveyor, it is cleaned, rinsed, and put in this zinc bath where it remains for 47 minutes.

An operator when loading an unfinished blade on the plating conveyor sets the pointer of the counter for the number of recycles desired. A lever advances the counter upon each pass through the plating tank. After the proper number of passes, an arm on the counter is sprung. The arm engages the limit switch on the transfer mechanism. This prevents transfer and permits the blade to continue its course around the machine to the unloading station.

Prior to plating, the propeller blades are balanced on Gisholt machines. After testing, the chief plating operator determines the number of recycles each blade should undergo to achieve a proper balance. Each cycle puts on a 0.003-inch to 0.0005-inch zinc plate. Average number of recycles is four. Finished blades, after being sandpapered and lacquered, are again tested for balance.

Before blades are put back on the conveyor for recycle through the zinc bath, and after scrub-down, they are subjected to a continuous water spray (Fig. 6) to prevent any formation of zinc oxide, which would adversely affect further plating.

3. By-passing Certain Tanks.

Some blades do not require reverse current alkaline cleaning or a muriatic acid dip, and must by-pass those operations.

Solution

By-passing is accomplished in either of two ways: (1) The operator raises a small flag that is attached to the counter. A limit switch at the station to be by-passed is contacted by this flag, signaling the carrier arm not to descend. (2) An operator may set a timing device on the control panel, adjusting the descent of the carrier arm above certain

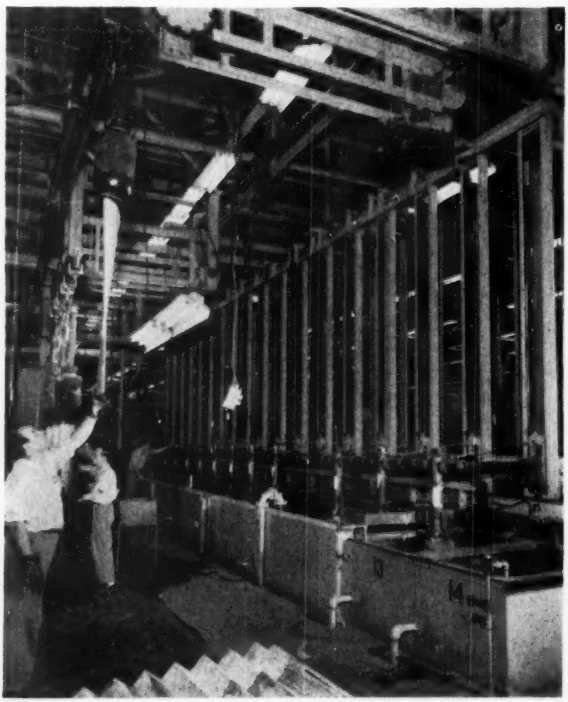


Fig. 5—Transfer mechanism delivers blade to monorail. The blade passes down the line for recycling. Operators in background are inspecting the blade for rough spots. Note that a section of the monorail drops to facilitate inspection.

tanks. The arm will remain up during the three-minute cycle. After the three minutes, the arm moves to the next station and continues normal operation.

Timers on the control panel may be adjusted to delay set-down of a piece of work into any tank. This is presently being done at one muriatic acid tank where it has been found desirable to immerse the blade for slightly less than three minutes.

4. How To Control Solution Flow

The problem: To lay out the best possible tank and pipe arrangement, and to draw up the simplest and most foolproof type of instructions for controlling the complicated flow of solutions. In this standard zinc plating process, solution is made up in a 2,000-gallon mixing tank. Each six months, the 10,000-gallon plating tank is emptied into a 12,000-gallon storage tank to permit cleaning of the plating tank. Other tanks comprising the system are a precoat slurry tank, a filter tank, a primer tank and a 1,000-gallon overflow tank. Controlling flow are 25 valves. Pipes carrying solution are Saranplastic lined.

Solution

Tanks were placed, and valves located and tagged. The filter tank, Industrial filters, mixing tank, overflow tank and piping are located in the concrete-lined pit that the plating machine is set into. The storage tank is outside the plant.

A table tells where each valve is located, and specifies whether a valve should be opened or closed during six key operations. These operations are: Normal operation of zinc plating tank, emptying mix tank into storage tank, pumping plating solution to storage tank, operating zinc tank with the mix tank, operating zinc tank without the mix tank, and operating flow through the precoat tank. The table is posted on the wall in the pit for reference.

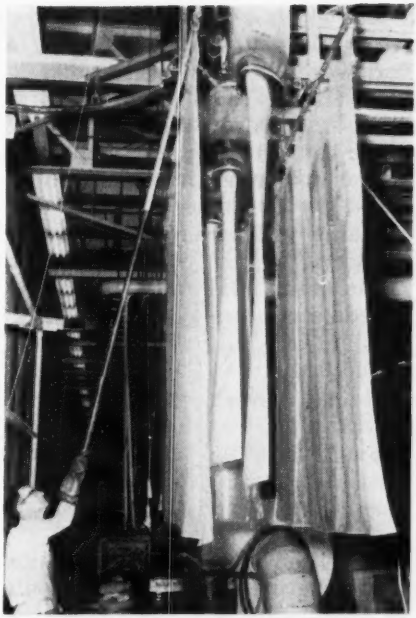


Fig. 6—Inspected and scrubbed blades pass along the monorail to this rinsing station. Blade in the background will be picked up by the transfer mechanism, automatically placed on a carrier arm of the plating conveyor for recycling through the zinc bath.

5. How To Protect Certain Areas From Solutions

A section of the propeller blade, located near the hub of the propeller, called the fairing, is made of hard rubber. The problem: how to protect this section from acids, alkalies, water and plating solution.

Solution

Hamilton Standard has developed

a boot which is placed on top of the fairing prior to plating. Made of a flexible rubber and fitted tightly to the blade, the boot is inflated with two pounds of air (Fig. 2). An operator can tell at a glance if the boot is or is not properly fitted.

6. How To Conserve Water

Water, while available, is not in abundant supply at the Windsor Locks plant. Hence, Hamilton Standard conserves water wherever possible.

Solution

Hamilton has placed electric eyes on all spray rinse tanks. When the blade is lowered into these tanks, the beam is broken and spraying commences. When the blade leaves the tank, the water is shut off.

Hamilton Standard, through automatic plating, has achieved a substantial increase in productive capacity with a minimum increase in floor area.

Chiefly responsible for the more consistent deposits being turned out are the time-cycling features of the automatic plating machine that remove much of the human element from the plating operation. All in all, Hamilton Standard is getting better plating at less cost.

VANEAXIAL BLOWER BULLETIN. Direct-drive vaneaxial blowers, three types of belt-driven vaneaxial blowers, and a special portable blower for exhausting fumes from tanks are described in a bulletin issued by the **Hartzell Propeller Fan Company**, Piqua, Ohio.

The 16-page booklet, **BULLETIN A-110**, includes dimension drawings and figures, and complete air delivery tables for all of these blowers. Two of the belt-drive models, a high-temperature blower and a new design for low volume, high pressure requirements, have not been shown in any previous catalog.

CHEMICAL-RESISTANT ENAMELS. An illustrated bulletin and data folder describing the use of Torex, Rigortex, and and Ramuc chemical-resistant enamels in various industries is available from **Inertol Co., Inc.**, 480-490 Frelinghuysen Ave., Newark 5, N. J.

Listing the various application characteristics of each enamel, the bulletin makes specific recommendation of one or more of the chemical-resistant enamels for use in contact with various chemical solutions.

Additional products manufactured by the company for corrosion resistant applications, and a partial list of users of Inertol products conclude the folder.

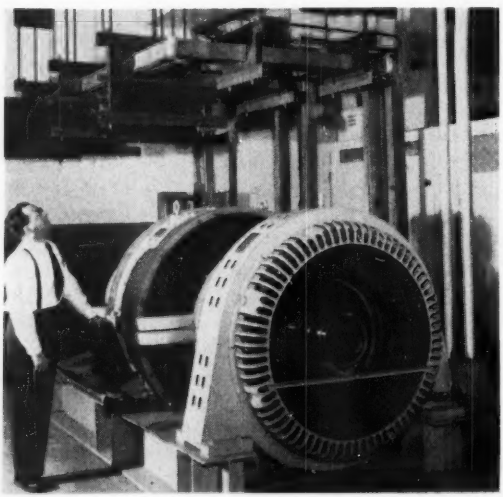


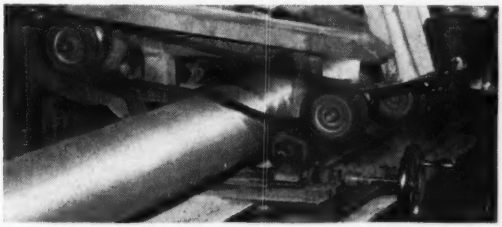
Fig. 7 — Supplying current for the plating operation is this H-VW-M synchronous motor-driven, DC generator with a 10,000-ampere capacity.

(Illustrations courtesy Hamilton Standard, Windsor Locks, Conn., and Hanson-Van Winkle-Munning Co., Matawan, N. J.)

HOW WOULD YOU

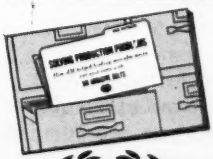
Solve it?

1 PRODUCTION PROBLEM: To cut unit costs of polishing aluminum street lighting standards. Pfaff & Kendall, Inc., was finishing one 30-foot pole per hour by hand sanding its entire length as it rotated in a lathe bed.



2 SOLUTION: A 3M Representative suggested that this Newark, N.J. manufacturer switch to the 3M Method using Three-M-ite Resin Bond belts installed on two swing grinders mounted in tandem. Poles were rotated in the lathe bed as before. Grinding was done *behind* the contact wheel on the unsupported belt.

3 RESULTS: An immediate production increase from 1 to 4 finished standards per hour, with a higher quality finish.



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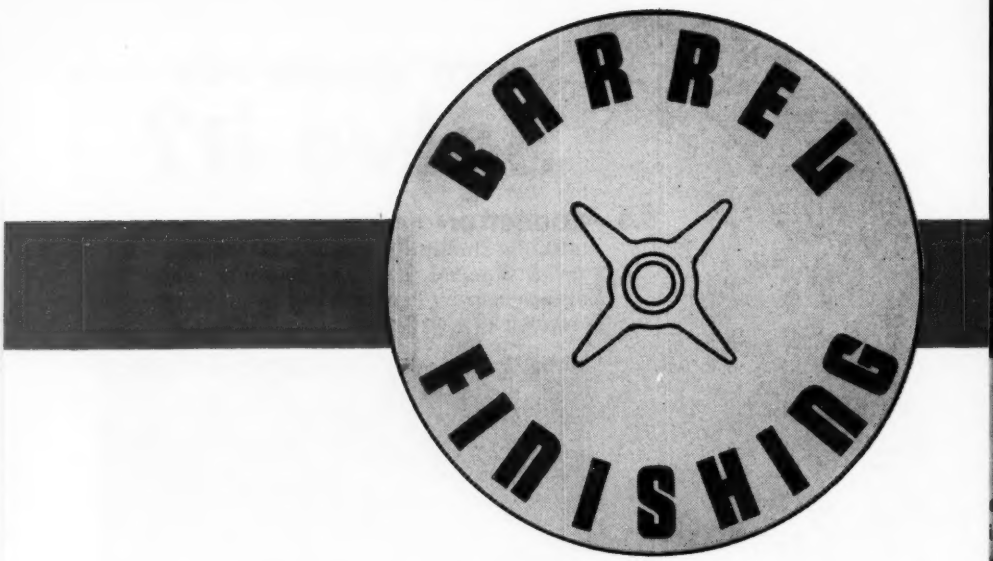

Procedure for Refinishing Tableware

QUESTION. One of our activities is the reclamation of used, silverplated, flat tableware. Briefly, using our present method, the silver is stripped from the old ware electrolytically, the stripped ware is ground in barrels using an abrasive, the ground ware is given a bright, smooth finish by hand honing or buffing each piece, and the blanks are then replated.

It is desirable to eliminate the hand honing or buffing operation and replace it with a mechanical substitute. Is there a barrel finishing method for brass and nickel silver which can be substituted for the hand honing or buffing operation without reduction in the brightness, smoothness, or other surface qualities of the finished blank?

Will you please forward the following data for equipment and materials needed for such a process:

1. Barrel specifications
   a. Shape
   b. Size
   c. Lining
2. Abrasive, polish, detergent, and vehicle
   a. Amounts
   b. Sizes (solids)
3. Operation
   a. R.P.M.
   b. Angle of rotation
   c. Suggested time cycle.

Any information you can furnish will be greatly appreciated.

J. P. W.

ANSWER. From your description I assume that you are using the sharp cutting abrasive alone, without any other load element. You state that the flatware you are seeking to reclaim is composed of brass base as well as nickel silver.

of Metal Products

By H. LEROY BEAVER
Beaver Barrel Finishing Research
Lansdale, Pennsylvania

The procedure of stripping the remainder of the silver plate from the base metal electrolytically is quite all right. I do not think it is actually necessary to barrel grind the flatware with as harsh a material as the fast cutting alundum unless the flatware pieces are either intolerably scratched or badly pitted. Both of the metals you mention are comparatively soft and should respond to a less harsh abrasive medium.

In answer to your request for data, the following is submitted:

1. Barrel specifications. This work might be best performed in a barrel 12 inches in diameter and from 24 to 36 inches long. It may be either a polygon or octagon in shape, and for cutting down or smoothing, it may be unlined or lined with hard maple, neoprene or rubber.

2. Abrasive, polish, detergent, and vehicle. You will of necessity require some weight carrying medium. If you have a gravel deposit in the area, you might secure a quantity of smooth pebbles in the size range from 1/8 to 3/16 inch inclusive. You should be able to operate from 350 to 700 pieces of flatware in the barrels suggested, but the entire load of pebbles and flatware should fill the barrel to slightly less than half full.

Assuming that you have a barrel loaded with flatware and pebbles, level off the entire load and then add water to a depth of one inch over the surface of the mass, keeping account of the number of gallons used.

Now, for the abrasive medium I am going to suggest a material that is variously termed diatomaceous earth, or infusorial earth, but even better known in German, as "Kieselguhr." This material composes the base abrasive for practically all of the "rub on" metal polishes. Its base is the fossil remains of small sea creatures called diatoms. One of the principal suppliers of this material is the Johns-Manville Company.

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The material is designated as "Filtercel" or "Celite." The grade you will want is that called "Snowfloss" or "Superfloss." The proper proportion of this material to use is five pounds to each gallon of water in the barrel. The length of operating time depends, of course, on the surface condition of the flatware pieces.

The final finish on the parts as they come from the barrel will be a soft silky matte or Butler finish; and this will be more apparent following a conventional cleaning cycle using any commercial cleaner adapted to brass or nickel silver.

From this point you can go in either of two directions. First, after the cleaning you can place the parts in another barrel, preferably with maple liner, but substituting hardened and polished steel balls for the pebbles previously used in the cutting down operation.

As an intermediate operation, once the parts are taken from the barrel following the cutting down or smoothing operation, it would be altogether acceptable practice to subject them, either the brass or the nickel silver, to a conventional acid bright dipping operation. A conventional bright dip for brass is:

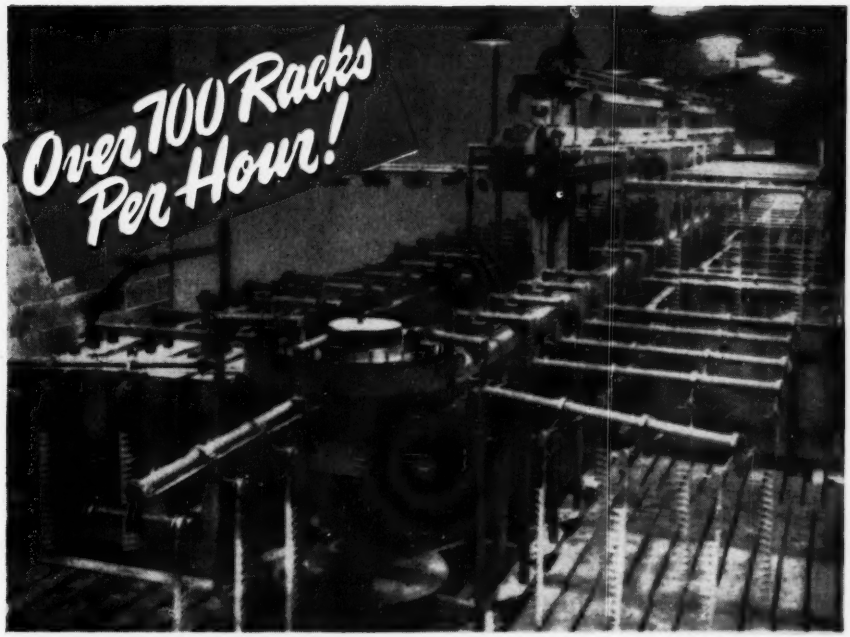
Sulfuric acid	2 gal.
Nitric acid	1 gal.
Water	1 qt.
Hydrochloric acid	½ fluid oz.

Operate at room temperature.

A conventional bright acid dip for nickel silver is:

Water	5 gal.
Sulfuric acid	1 pt.
Sodium dichromate	½ lb.

These may be made up in earthenware crocks, but the crocks should be kept in a water bath at all times.



Lasalco's VERTICAL-LIFT FULL AUTOMATIC

Floor Area, Only 74' x 15'

Another production-boosting, profit-making installation by Lasalco:

- Now used for anodizing, the above equipment can be easily arranged for plating by a simple, quick and inexpensive conversion.
- Driving power for the entire machine is hydraulic. The elimination of speed reducers and all excessive mechanism results in much lower maintenance cost.
- Only two operators, to load and unload, can maintain maximum production.
- In plating work using several acid dip tanks, or in anodizing work requiring two or more dye tanks, selective operation is easily arranged to permit either the use or bypassing of one or more tanks.

From all available information this machine is the fastest producer ever installed in so small a floor space—74' x 15'. If you want to expand production and reduce operating and unit costs, Lasalco engineers will be happy to give you complete details and discuss your problems without obligation.

Racks shown in illustration are 24" long, 4" wide, 3" thick.

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After dipping, the basket should be plunged into clear water first, then into an alkaline neutralizing solution of 4 oz./gal. sodium bicarbonate, then into another clear (and preferably hot) water rinse. On the nickel silver the dichromate should give you considerable luster and you might be able to plate directly on that surface without an intermediate bright ball burnishing operation.

Various soaps are used as lubricants in bright burnishing with steel balls. A sodium stearate, or a tallow base soap is recommended. The barrel finishing of table silverware, a generally accepted practice in the better hotels, restaurants and institutions in the United States, originated in Switzerland and was the invention of one Jean Uebersax. The silver burnishing machines were manufactured by a concern known as Wenger & Co., Delemont, Switzerland. They also supplied the silver burnishing soap. The European silver burnishing machines above mentioned have the trade name of "Tahara," a word derived from the Arabic signifying "cleanliness."

Operation. The speed of the barrel, of course, is related to its size. You will find that for manufacturing 12 by 24 or 12 by 36 inches are the sizes used in cutting down, and the speed should be held to around 24 r.p.m. For maintenance in the food service field, that is, hotels, restaurants and so forth, the barrels generally used are either 8 by 24 or 8 by 12 inches, depending on the size of the establishment, and these operate at approximately 35 r.p.m. From your question regarding the "angle of rotation," I would assume that you are using an oblique tilting type of barrel, sometimes termed pear shaped. I don't think I would recommend this type of barrel because the parts, being of lesser specific gravity than the operating mass, will have a tendency to creep toward the front or low pressure area of the barrel, and the final finish will not be as uniform as would be the case were a cylindrical type of barrel used in the operations.

I think you can appreciate just how difficult it is to set down a course of procedure in the absence of actually seeing the condition of the parts you plan to reclaim.

It is estimated that Canada's output of nickel in 1953 reached 285,000,000 pounds, or about 85 per cent of the free world's total production.

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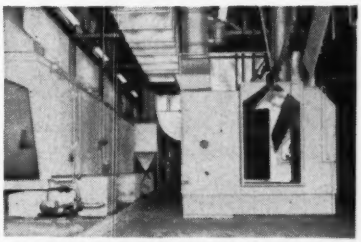
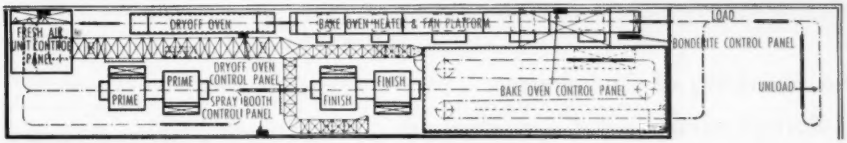
Room Conditioner Manufacturer Builds Plant in Deep South...Chooses Complete Peters-Dalton Paint Finishing System





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The rapidly expanding Room Conditioner field requires more manufacturing capacity. To meet these requirements, one manufacturer constructed a new plant in Alabama. When planning the plant layout, utmost consideration was given to installing the best and most efficient equipment. For the complete paint finishing operations, Peters-Dalton, Inc. was chosen. Illustrated here is a small part of this Finishing System—it was designed and installed by P-D engineers.

Space saving was of great importance, and layout for the practical flow and handling of parts and finishing required complete understanding of the manufacturer's needs. These were solved by P-D engineers. The system they installed is now functioning smoothly . . . and efficiently handling production requirements at minimum cost.

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Spotlighting FINISHING progress

The Finishing of Aluminum

Adherence and Corrosion of Electroplated Aluminum

A RECENT study by German workers of the effect of various pretreatments and final plating procedures on the adherence of electroplated coatings to aluminum and on the corrosion resistance of electroplated aluminum panels is reported by F. Solar in "Metalloberflache," 7, 118B (1953). The author points out that the thin oxide layer normally present on aluminum is dense, adherent, insoluble in water, a nonconductor of electricity, and one which forms rapidly when the metal is exposed to air or moisture. This oxide layer tends to isolate the aluminum from the deposited metal and so interferes with the adherence of the deposit. The high coefficient of thermal expansion of aluminum is another unfavorable influence on the adherence of plated coatings on aluminum. As is shown in Table I, the coefficient of expansion of aluminum is appreciably higher than that of any of the metals with which it is

Dr. Seymour Senderoff
Supervisory Chemist,
Electrodeposition Section
National Bureau of Standards

•

A Monthly Digest of Current Technical Progress Indicating Significant Trends and Developments in the Finishing Industry

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ACP metal protective chemicals include: protective coating chemicals for steel, zinc and aluminum; metal cleaners and rust removers; final rinse controls; pickling acid inhibitors; copper coating chemicals; soldering fluxes; alkali cleaners and addition agents; copper stripping and brightening solutions.

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Table I

METAL	COEFFICIENT OF THERMAL EXPANSION, mm/deg. C. x 10^{-6}
Chromium	8.1
Iron	12.5
Nickel	12.6
Copper	16.3
Silver	18.5
Brass	19 (approx.)
Aluminum	24

usually plated. As a result, even small temperature changes put severe stresses on the interface between aluminum and a deposited metal and cause separation unless the bond between the metals is exceptionally strong.

The significance of this property becomes especially apparent when one attempts to buff a plated coating on aluminum. The local heat developed during buffing frequently causes blistering or exfoliation of the coating when the conditions of deposition are not especially favorable for the development of good adherence. In fact, the author used a simple buffing test as an empirical measure of the degree of adherence of the coating.

Corrosion of plated aluminum articles is a serious problem because

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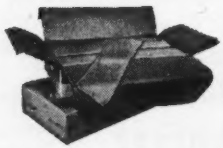

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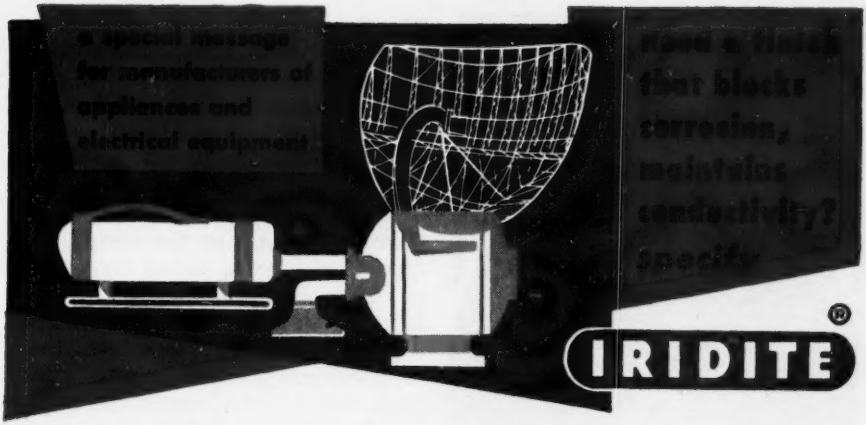

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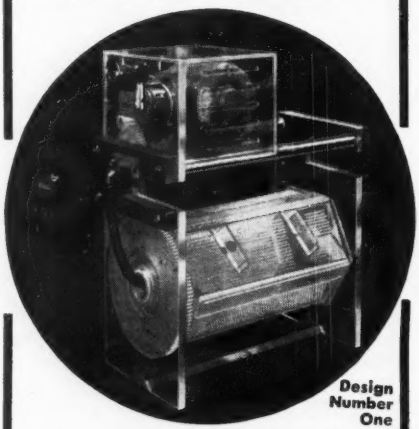

Design Number One

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all of the metals with which it is plated are usually much more noble than the aluminum (with the possible exception of zinc) and thus accelerate its corrosion if there are any pores or discontinuities in the plate. Further, since the corrosion products of the aluminum occupy a greater volume than the metal, they tend to spring the plated layer, and so the corrosion properties and the adherence are somewhat related. The author emphasizes, therefore, that electrodeposits on aluminum must be pore-free and of reasonable thickness in order to fulfill their purpose.

There have been many procedures suggested for the attainment of good adherence and thick, strong coatings on aluminum. These suggestions have been placed by Solar into three general categories.

1. An alkaline pretreatment in which the natural oxide layer is dissolved and a thin layer of metal, usually zinc, brass, or copper, is simultaneously deposited in its place. This is followed by plating with copper or brass from a cyanide solution. The pretreatment is done at room temperature without current. A deposit about 0.1 micron thick is obtained.
2. An acid pretreatment whereby the aluminum is more vigorously etched and a thin layer of metal, such as iron, nickel, or manganese, is simultaneously deposited. This is followed by plating with nickel from a weakly acid solution. This pretreatment is also done without current, but elevated temperatures (70-95 deg. C.) are used.

to page 74 →

BULLETIN P-100

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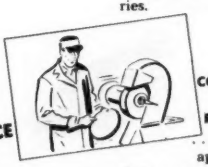

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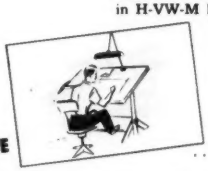

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CADUX HS—Produces brilliant, pure cadmium deposits at high plating rates in still tanks, conveyors and mechanical cylinders. A bath highly stable and tolerant to impurities.

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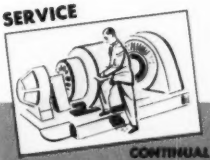

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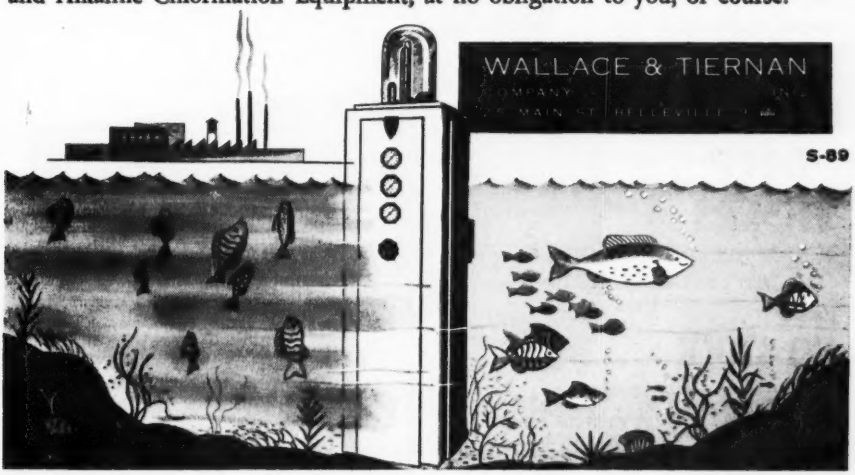
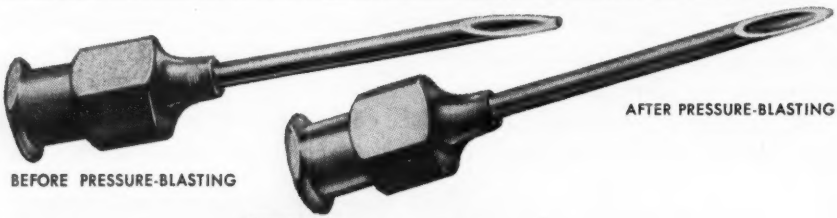


3. Pretreatments whereby the natural oxide layer is thickened with or without the use of current. These thickened layers are then dissolved in acid or alkaline solutions (sometimes electrolytically) with simultaneous or subsequent deposition of copper or other metals. As a result of this procedure, an oxide network which acts as an anchoring base for the deposited metal remains.

In order to compare deposits produced by these procedures for adherence and corrosion resistance, hard-rolled aluminum strips (99.7 per cent Al), 100 by 25 by 0.1 mm. (0.5 sq. dm.) were quickly degreased in 10 per cent sodium hydroxide solution at 40 deg. C., rinsed, dipped in 1:1 nitric acid, and after rinsing, treated by a method representative of one of the three categories listed above. Then, according to the method used, they were plated with copper from a cyanide solution, with nickel and copper from an acid solution, or with copper only from an acid solution. The total thickness of plate in each case was 10 microns.

Fifteen samples were prepared by each of the three procedures and ten were tested for adherence by buffing one end of the sample down to the base metal with a lime compound on a cloth wheel, and examining the plate for blisters or exfoliation. The other five samples from each procedure were immersed in 3 per cent sodium chloride solution at room temperature for 500 hours. A strip of aluminum and a strip of copper were treated in the same way



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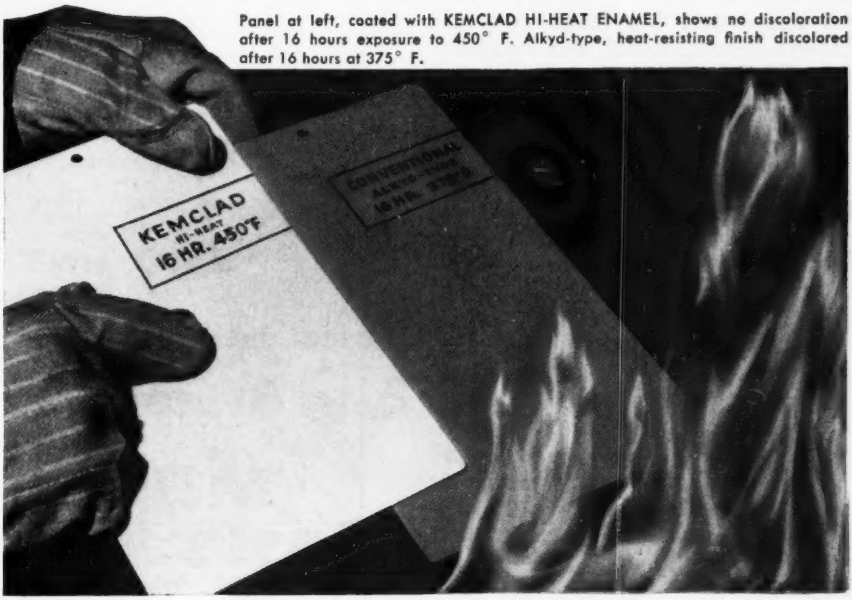

Panel at left, coated with KEMCLAD HI-HEAT ENAMEL, shows no discoloration after 16 hours exposure to 450° F. Alkyd-type, heat-resisting finish discolored after 16 hours at 375° F.

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for comparison. The strips were removed, rinsed, dried, and weighed every 100 hours; then replaced.

Result for Method 1. The degreased strip was immersed in a strongly alkaline zincate solution at room temperature; the zinc layer thus deposited was dissolved in nitric acid; the piece again immersed in the zincate solution; finally plated with copper from a cyanide solution. Nine of the ten buffed samples developed severe blistering, indicating poor adherence. In the corrosion tests the samples were observed to have developed white corrosion spots within one hour after immersion and the weight gain due to formation of $Al_2O_3 \cdot xH_2O$ was very rapid after 100 hours (see curve 1, Fig. 1). After 300 hours appreciable destruction of the aluminum under the copper layer is evident. The undercutting of the copper by corrosion of the aluminum resulted in the complete exfoliation of an almost undamaged copper plate in 500 hours.

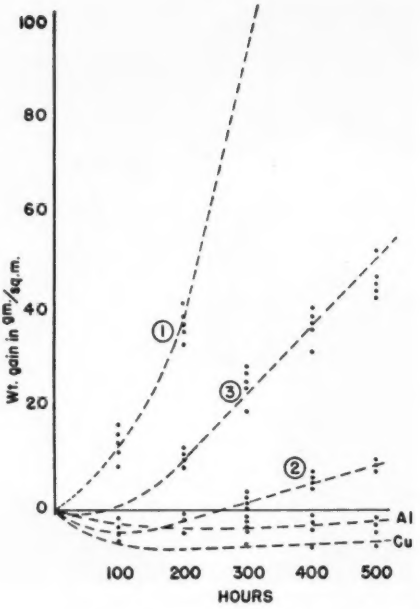

Fig. 1—Corrosion rates of aluminum samples plated by three different methods. Corroding medium—3 per cent NaCl solution, immersion at room temperature.

Result for Method 2. The degreased sample was immersed for 30 seconds in a 3 per cent HCl - $FeCl_3$ solution at 80 deg. C., plated with 5 microns nickel, and finally with 5 microns copper from an acid solution. None of the ten buffed samples showed any blistering or other defects. This the author considered as indicative of satisfactory adhesion. In the corrosion tests, attack was first observed after 200 hours. The weight gain was slow (see curve 2,

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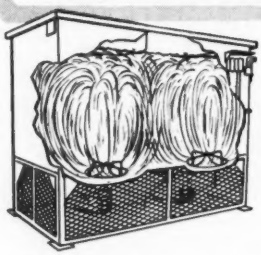

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Fig. 1); the corrosion was localized in spots through the plated layer rather than general corrosion underneath it, but even this reduced amount of corrosion appeared rather voluminous.

Result of Method 3. The degreased sample was immersed for ten minutes in a 6 per cent Na_2CO_3-Na_2CrO_4 solution (MBV solution, German Patent 656663) to form an aluminum oxide layer 1 to 2 microns thick. This oxide layer is then partially dissolved by immersion in an acid copper plating solution from which 10 microns of copper is then deposited on the etched oxide.

None of the ten buffed samples showed any blistering or other defect. Again this was considered to represent satisfactory adhesion. In the corrosion studies no appreciable weight gain was observed for about 100 hours, probably due to the protective action of the oxide layer which was present. Weight gain was rapid after this, as shown in curve 3 of Fig. 1. In contrast to that of Methods 1 and 2, the corrosion products in this case were granular and tightly adherent to the surface. The corrosion attack was mostly by small pits, was more widespread than by Method 2, and showed a tendency toward blister formation.

The copper and aluminum strips included for comparison showed a slight weight loss (approximately 0.1 per cent). The slight corrosion was general on the copper and pitted on the aluminum.

In comparing the types of corrosion produced by the three methods, Solar points out that by Method 1, general corrosion of the aluminum

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Table II

METHOD NO.	PRETREATMENT	PLATING SOLUTION
1	Strongly alkaline, pH greater than 13	Alkaline pH 9.5 to 10.5
2	Acid, pH about 1.5	Weakly acid, pH about 6
3	Weakly alkaline, pH about 10	Strongly acid, pH about 0.9

occurs underneath the plated layer. Plating by the other two methods results in local corrosion through the pores of the 10-micron plated layer. The significant conditions of the three plating methods are summarized in Table II.

The author believes that the exclusive alkaline treatment of the aluminum in Method 1 is the cause of the poor adherence and corrosion resistance of plates produced by this method, and that this is due to the well known difficulty in rinsing alkaline films from metals. He points out that the residual alkaline film in Method 3 is neutralized by the final acid treatment and so better results are obtained. The acid film from the pretreatment solution of Method 2, however, is very easily rinsed off and as a result the adherence of the plates produced is much improved. The very low corrosion rate resulting from Method 2 is partly ascribable to the smaller potential difference between aluminum and nickel as compared to that between

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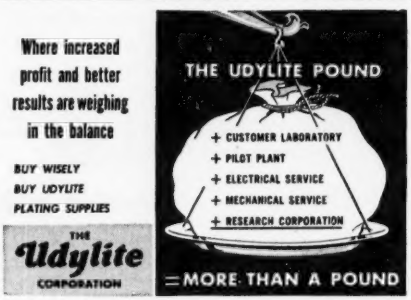
aluminum and copper. The most desirable procedure would involve the use of weakly acid pretreatment solutions and plating solutions which operate at a pH of 5 to 6. He also frowns on the use of copper as a protective layer over aluminum unless it is thick enough to be pore-free.

Solar's conclusions with regard to the most desirable pretreatment and plating procedure are rather surprising. The acid iron dip followed by nickel plating, which he recommends, was one of the first procedures suggested for the electroplating of aluminum and had been generally discarded over ten years ago (in this country, at least) in favor of the zincate dip process. In a review published in an English journal in 1942, it was said that "the sodium zincate dip is an advance on the metal dip, and is perhaps the most notable contribution in this field in the past decade" (Light Metals, *5*, 369, 1942). It was with the introduction of the zincate dip that plating on aluminum achieved commercial success in this country.

It would be of considerable interest to learn whether Solar's results will be confirmed by other investigators, or whether they may be attributed to accidental factors.



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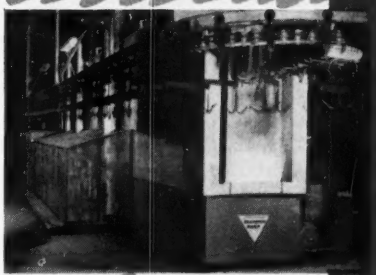

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PIONEERS IN ENGINEERING HEAT APPLICATIONS FOR INDUSTRY

Brushing Deburrs and Finishes Edges of Aluminum Parts

A POWER brushing method for removing feather burrs from a machined slot in an aluminum fuse component has increased production at The Gilman Engineering Company, Wisconsin. Hand methods for doing this job, with output of 360 units per hour, proved unsatisfactory. Not only was this hand operation too slow, but results were not uniform and left poorly finished edges.

With the help of power brushing specialists from The Osborn Manufacturing Company, Cleveland, Gilman engineers constructed a rotating brushing machine equipped with three Osborn 0.005-inch wire wheel brushes. There are 16 spindles on the table. The aluminum fuse parts do not rotate, they rest on the pins. The table rotates clockwise at two revolutions per minute; the brushes run at 3450 r.p.m.

The first brush in position A (Fig. 1) rotates clockwise against the slot. The brush in position B rotates counter clockwise to brush the other side of the slot edge. The third brush, position C (Fig. 23, sweeps down through the slot to finish the bottom edge.

The slots come clean and smooth, at a rate of 1400 units per hour, an increase of 1040 units of higher quality.

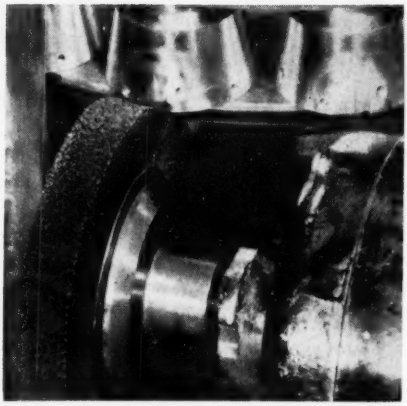

Fig. 2—This close up shows how the brush removes the edge on the bottom of the slot (position C). *(Photos courtesy The Osborn Mfg. Co., Cleveland 14, Ohio)*

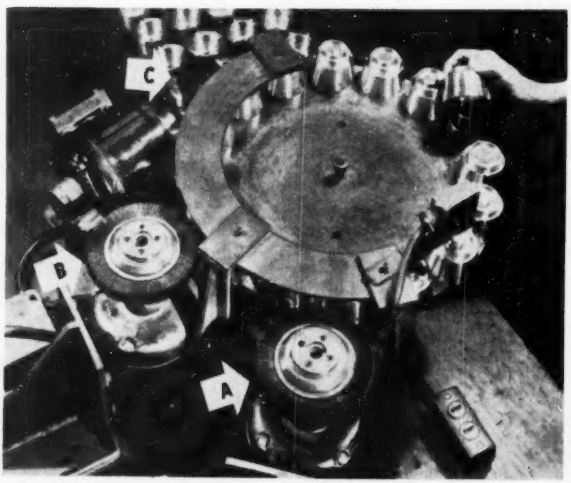

Fig. 1—This rotating brushing machine removes feather burrs from a machined slot in an aluminum fuse component at the rate of 1400 per hour. The first brush in position A rotates clockwise against the slot. The brush in position B rotates counter clockwise to brush the other side of the slot. These not only remove the burrs but also finish the edge. The third brush, position C, sweeps down through the slot to finish the bottom.

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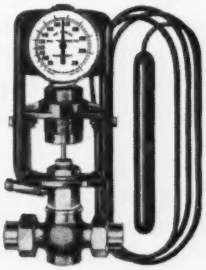

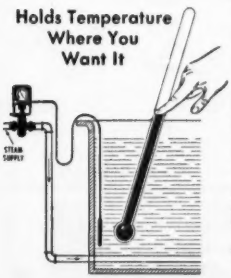

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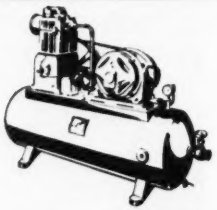

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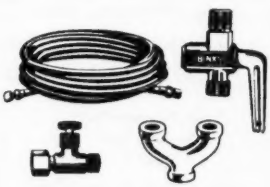

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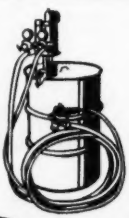

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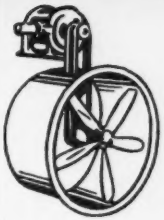

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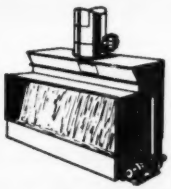

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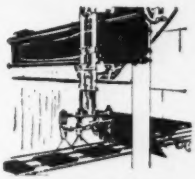

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Barrel Nickel Brightener

Jelco Products, 153 East 26th St., New York, N. Y., has announced a Barrel Nickel Brightener for the metal finishing industry. The material is stated to be a single addition agent capable of wide operating range, which can be used in both hot and cold solutions. Faster, brighter deposits are possible through the use of the material which does not break down or accumulate.

For information circle No. 1 on Reader Service Card inside back cover.

Metal Pretreatment

Improvements in Type AS-4 Vinsynite, one of a group of three corrosion-resistant metal pretreatments manufactured by Specialty Coatings, Inc., division of Thompson and Co., Oakmont, Pa., have been announced. While the original Type AS-4 required baking for maximum performance, the new version gives excellent performance when either baked or air-dried. In addition, unlike the earlier product, it is designed for use on all types of metals, both ferrous and non-ferrous. Thus it permits treating various types of metals in the same production line, without switchovers.

Each of the three Vinsynite types combines in one step the application of a phosphate coating and a thin primer-like film, thus achieving both corrosion-resistance and maximum adhesion for top coats of paint.

The type of Vinsynite recommended for a particular operation depends up-

on various conditions of exposure and upon the application methods to be used. Vinsynite may be applied by spray, brush or dip methods and its use does not require close chemical control or multi-stage baths.

For information circle No. 2 on Reader Service Card inside back cover.

Hot Dip Galvanizing Stop Off Coating

Manufacturer: Midland Industrial Finishes Co., East Water St., Waukegan, Illinois.

V-501 Stop Off Coating (for hot dip galvanizing process) is a clear coating, but can be pigmented black if a guide color is desired.

Stated to provide a protective film which will resist the chemical solutions and heat encountered in hot dip galvanizing and still prevent the zinc from adhering to the base metal, V-501 may be dipped, brushed, sprayed.

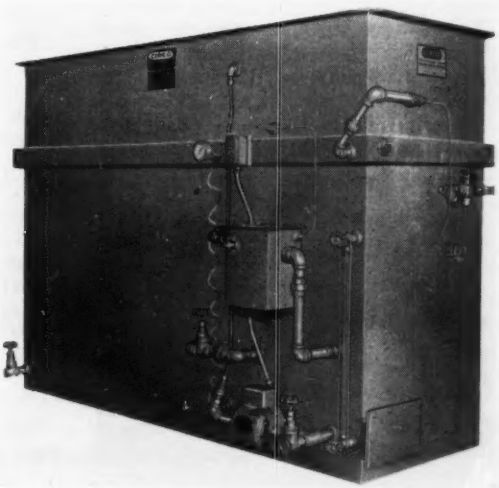
According to the manufacturer the coating has been successfully applied to the following surfaces: vapor degreased hot rolled steel, acid pickled and phosphatized hot rolled steel, vapor degreased cold rolled steel, and phosphatized cold rolled steel.

For information circle No. 3 on Reader Service Card inside back cover.

Vapor Degreaser

A vapor degreaser designed with a solvent storage tank as an integral part of the degreasing unit has been announced by Circo Equipment Co., 128 Central Ave., Clark (Rahway), N. J.

Other design features of the degreaser include an improved method of handling condensed water by means of a water separator, accurate, auto-



Vapor Degreaser

matic temperature control of the water circulating through the cooling coils; and the use of a circulating pump which operates by means of a rotating magnetic field, free from seal leaks.

The degreaser has been constructed to resist corrosion; for example, the moving parts of the pump are fabricated from stainless steel, and the rotor and end plates are nickel clad. Condensate coils are formed from copper tubing and nickel plated.

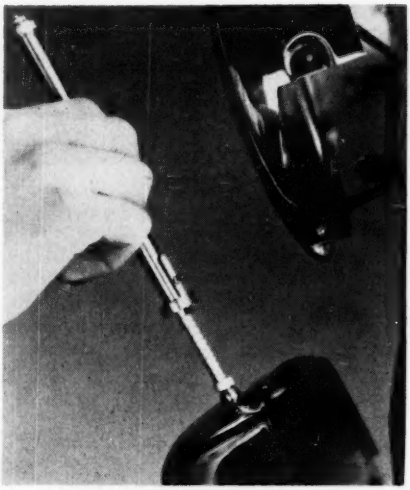
For information circle No. 4 on Reader Service Card inside back cover.

Thickness Tester

Platers Research Corp., 59 East Fourth Street, New York 3, N. Y., has introduced a thickness tester called the Pocket Handi-Gage.

The Handi-Gage is a magnetic instrument similar in size and shape to the familiar automobile tire gauge. When the magnetic end of the Handi-Gage is applied vertically to the surface to be tested and slowly pulled away, a calibrated inner stem appears. The distance the stem travels before the magnet releases itself from the surface is a measure of the thickness of the coating.

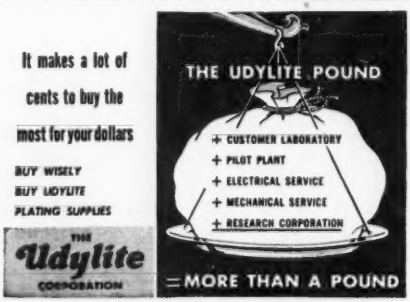
It will test the thickness of electroplated cadmium, copper, brass, silver, zinc, tin, lead, nickel, zinc-tin and lead-tin alloys on steel, as well as hot-dipped tin and zinc. It is ideal for testing the thickness of paint, plastic lamination, enamel and lacquer coatings on steel. It will test thicknesses from 0.0001 inch to 0.015 inch.



Pocket Handi-Gage

The Handi-Gage comes in a deluxe pocket size case, which weighs less than six ounces with the Handi-Gage and extra magnets for various thickness ranges. The Handi-Gage can be used on the production line, in the laboratory, or any other place where thicknesses are to be controlled. It may be used as a "go, no-go" thickness gauge at spray booths or plating tanks.

For information circle No. 5 on Reader Service Card inside back cover.



Infrared Lamp

Development of a new type of infrared lamp, "of tremendous potential" for scores of heating, drying, baking,

The experience of Watson-Standard Laboratories serves the metal coatings industry in many fields.

We have developed successful systems of finishes which are currently being used for **crown finishing, can decorating, exterior signs, metal awnings, high heat finishes for heaters, anti-corrosion finishes, high speed coatings** and many others. These are typical accomplishments.

The Watson-Standard Laboratories have formulated coatings for many uses and methods of application. We will assist you with your coating problem.

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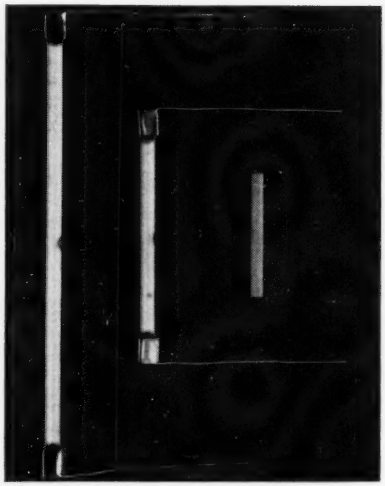
INDUSTRIAL FINISHES • PAINTS • PLASTICS • CHEMICALS

cooking, and other uses, has been announced by General Electric's Lamp Division, Nela Park, Cleveland 12, Ohio.

The infrared lamp has a compact tubular shape, slightly larger in diameter than a cigarette. The tube is made of fused translucent quartz.

Producing more than four times the energy concentration delivered by a 250-watt infrared bulb, the slender quartz lamp has ability to withstand high temperatures and the shock of violent temperature changes. Even when the tube is heated to a cherry red, it can be doused in water or, as a more severe test, may be touched by a piece of ice, without cracking.

Two sizes are being introduced, of 500 and 1000 watts, for use and circuit voltage of 115-125 and 230-250, respectively. They have "lighted lengths" of five and ten inches, metal clips on either end adding about an inch and three-quarters to the overall lamp length. From each end extends a flexible six-inch lead wire. As in all G-E infrared lamps, the heating element is a coiled tungsten filament.



General Electric's quartz infrared lamps; left to right: 1000-watt, 500-watt, and king-size cigarette.

Neither chopsticks nor drumsticks are the white rods being held by pretty Sharon Lee Brumley of Cleveland. They are General Electric's infrared lamps. Slender quartz tubes, instead of glass bulbs, enclose the tungsten filament. The infrared lamps are virtually impervious to shock from water, ice, or violent temperature changes, even when operating at full intensity.

The lamp produces higher energy concentrations in a small space — 100 watts per lighted inch of tube length; it produces full radiation almost instantly, not requiring a warm-up period; it produces visible light as well as infrared radiation, an advantage in some circumstances; it is extremely light in weight. The 500-watt size weighs three-quarters of an ounce, and the 1000-watt size seven-eighths of an ounce. It requires little maintenance, having a rated trouble-free burning life of more than 5000 hours.

First application of the new lamp is expected to be in industrial radiant

Reduce costs in your paint department with these Wyandotte products!

- **PRE-FOS*** — Cleans all metals; deposits phosphate coating; increases corrosion resistance prior to painting!
- **INDUSTRIAL NO. 38** — Alkaline cleaner for maximum detergency in spray washers!
- **P-1075** — Solvent-type paint stripper for immersion use; safe on all metals!
- **NORDALL*** — Nonflammable, low-cost, emulsion cleaner for spray washers; inhibits rust on ferrous metals!
- **PHOS-IT** — Concentrated, liquid acid detergent, rust remover and metal conditioner for steel, zinc, aluminum!
- **MERSOSTRIP** — *Accelerated*, alkaline paint remover; speeds recovery of rejected parts; cleans conveying equipment!
- **444-C** — Excellent brush- or flow-on paint stripper for large nonimmersible parts or equipment; penetrates multiple coats quickly!
- **FLOTE** — Unique water-wash spray booth product; prevents sinking paint sludge and clogging; eliminates tackiness!
- **HEDRAL** — Prevents paint adhesion on spray booth walls; allows overspray removal without scraping!

* REG. U. S. PAT. OFF.

Call your local Wyandotte representative, or mail the coupon today, for technical data on this complete line of versatile paint-department products. *Wyandotte Chemicals Corporation, Wyandotte, Mich. Also Los Angeles 12, California.*

Helpful service representatives in 138 cities in the United States and Canada

Largest manufacturers of specialized cleaning products for business and industry

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Wyandotte, Michigan

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_____

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City & Zone_____ State_____

drying and baking ovens. Because of the higher energy concentration it makes possible, and because it provides energy over a considerable range of wave lengths, advantageous in many processes, the new lamp promises to open up new fields in industrial drying and baking.

For information circle No. 6 on Reader Service Card inside back cover.

Chlorinator

Wallace & Tiernan Incorporated, 25 Main St., Belleville 9, N. J., has announced a chlorinator, the A-701, which will be introduced at the American Water Works Association Convention in Seattle on May 23rd.

First of a series that incorporates the latest developments of practical chlorinator design, the A-701 will feature such improvements as dual orifice meter which automatically, or by the flip of a switch, allows feed ranges up to 100 to 1; corrosion resistant materials wherever good structural design permits; linear scale reading of chlorine flow rate; and automatic electric, hydraulic, air or vacuum control. Maximum capacity of the A-701 will be 100 pounds per 20 hrs.

A-701 Chlorinator

For information circle No. 7 on Reader Service Card inside back cover.

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in any quantity of
Performance - Proved Government Specification
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Clear Metal Finishes • Colored Lacquers
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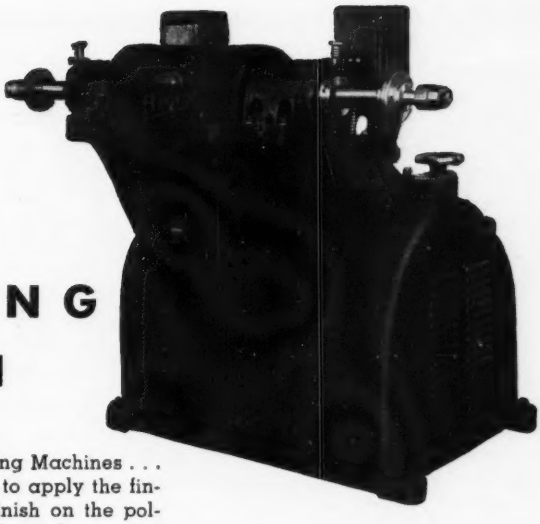
Specialized Production Finishes
Aircraft Finishes
RANDOLPH
PRODUCTS CO.
CARLSTADT, NEW JERSEY

Precision Flow Gun

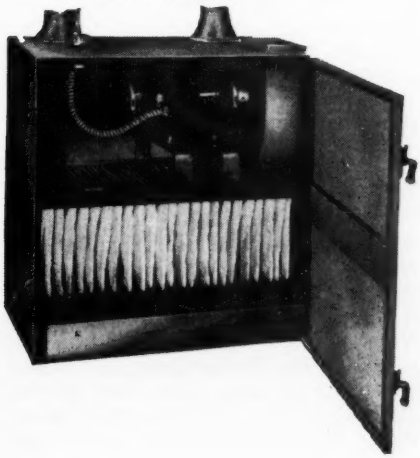
The Binks Mfg. Co., 3118-40 Carroll Ave., Chicago, Ill., has announced a precision flow gun, Model 31, which combines the features of two models formerly carried in the Binks line. Its design represents the recommendation



FOR THE FINISHING TOUCH

Hisey Buffing and Polishing Machines . . . the equipment you need to apply the finishing touch. The best finish on the polished product is largely dependent on the wheel operating at proper speed and without vibration. Operators know **Hisey** for these performance qualities. Too, operators like **Hisey** Buffing and Polishing Machines because they offer plenty of foot room and freedom of operation about the wheels. Production is fast and with minimum of effort.

All moving parts subject to wear are made with liberal reserve capacity and of materials scientifically selected. **Hisey** is a quality product and offers maximum production, low labor cost and minimum maintenance. Made in a wide range of types and sizes from ¼ H.P. bench mounted to 50 H.P. capacity.

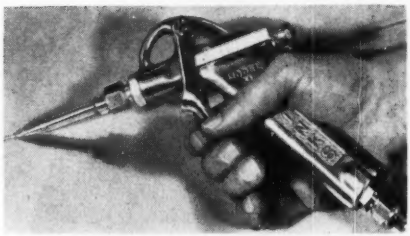


HISEY DUST COLLECTOR

Bag type Dust Collector, made in three sizes. For use with all **Hisey** Buffing and Polishing machines. Cyclone type also available in three sizes.

Write for Catalog 72 PL today!

Hisey THE HISEY-WOLF MACHINE CO.
CINCINNATI 8, OHIO
Division of The Cincinnati Electrical Tool Co.



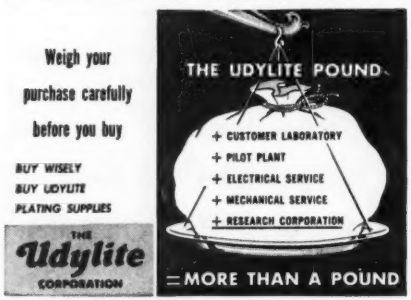
Model 31 Precision Flow Gun

of users of flow guns plus extensive experimental work of Binks' engineering department.

Designed to provide increased efficiency in flowing sealing compounds such as asphalt, rubber cement and similar heavy materials, the gun can also be used to seal gaskets, mouldings, cracks, corners and crevices on auto bodies, refrigerators and other products. No atomizing air is used. The material is forced from a material tank or pumped by one of the many types of material handling pumps.

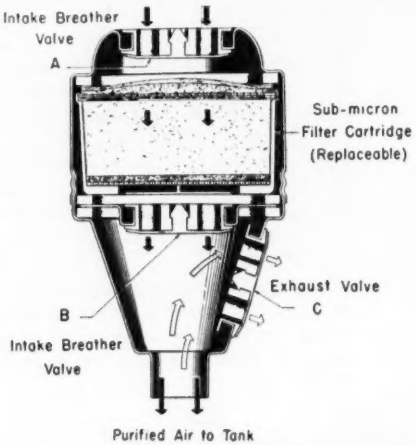
A selection of sixteen nozzles with orifices of various sizes and shapes for many types of work are offered. A special model of this gun, designated as 31V, for use in applying abrasive materials in the ceramic field, is available.

For information circle No. 8 on Reader Service Card inside back cover.



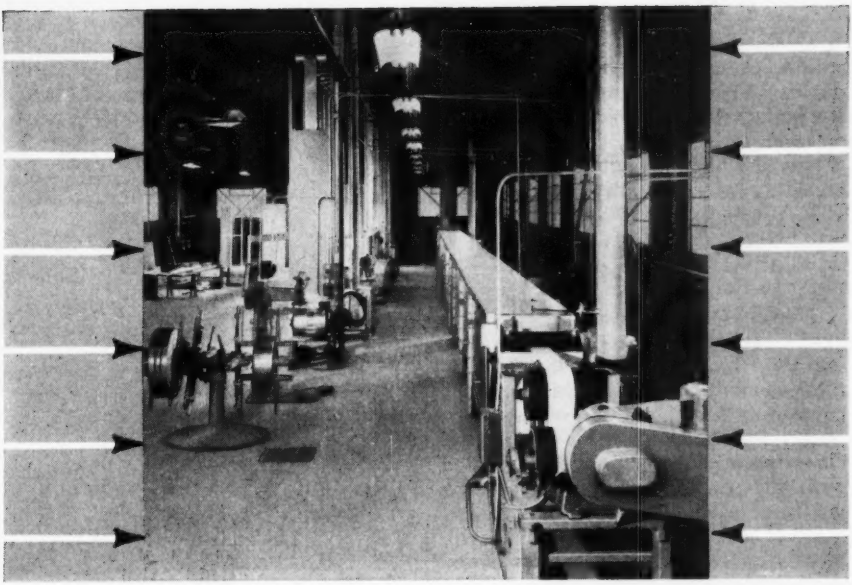
Ventgard for Distilled Water Storage Tanks

The Barnstead Ventgard, product of Barnstead Still & Sterilizer Co., 12 Lanesville Terrace, Forest Hills 31, Mass., makes it possible to store distilled water in storage tanks and yet protect its high purity from air borne contamination. The Barnstead Ventgard prevents organic vapors, alkali and acid gases from entering the tank. Tests conducted recently show Ventgard removes even carbon dioxide, which is present in concentration of almost 500 p.p.m. in the average laboratory or hospital room.



Ventgard for Distilled Water Storage Tanks.

Illustration shows how the Ventgard filter-breathes pure air into distilled water storage tank. Airflow sequence is indicated by arrow—solid arrows for intake, outline arrows for exhaust. When water level in tank is lowered, air enters the Ventgard through intake valve (A). It then passes through the submicron filter cartridge where particulate matter is removed and where



Don't Let Small Space Deprive You of
ROLLACOATING Speed and Economy

Here's one way Gasway engineers adapted continuous ROLLACOATING to restrictive length requirements. By developing a U-shaped unit, they U-tilized available space for double-duty effectiveness. The strip passes through an elevated cross-over, at rear. Feed and re-wind are virtually side by side for added convenience of operators.

Don't take it for granted that limited space makes efficient ROLLACOATING out of the question. Vertical installations, multiple parallel lines operating at slower speeds, and other Gasway innovations work wonders in restricted areas.

Engineering initiative, however, is just one "plus" of dealing with the leader, for Gasway ROLLACOATING quickly pays for itself, as well as for building alterations. A continuous unit, as illustrated, can perform every function from cleaning and treating to coating both sides, baking, and re-coiling—all in a single pass. It gives you fastest-of-all paint application without wasting a precious drop. Write for the whole savings story.

Through speedy metal coating, then forming, ROLLACOATING has revolutionized manufacturing methods in industry after industry. We'll be glad to give you full facts on continuous units as well as on individual sheet coaters.

Gasway
CORPORATION

6463 N. RAVENSWOOD AVE.
CHICAGO 26, ILLINOIS

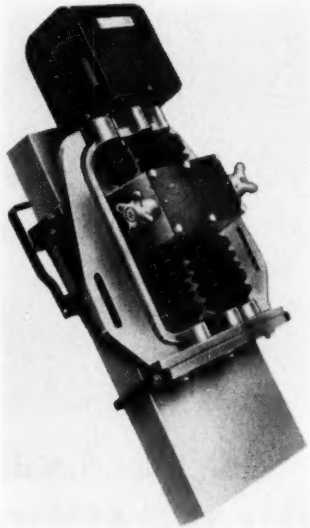
special chemicals absorb gaseous impurities. Finally, the purified air enters the tank through valve (B). When water level is increased, intake breather valves (A) and (B) automatically seal, expelling air through exhaust valve (C). When there is no change in the water level, all valves remain closed thus protecting both cartridge and water in the tank from contamination.

The Ventgard consists of the "Ventgard" chamber with breather valves and the "Ventgard" filter element. The filter element is a replaceable cartridge containing a combination of pre-filter, purifying chemicals and after-filter. Chamber is of copper, carefully coated with pure tin on the interior. Exterior finish is attractively polished nickel plate. The Ventgard can be used with metal distilled water storage tanks and with Pyrex tanks.

For information circle No. 9 on Reader Service Card inside back cover.

Automatic Buffing Compound Applicator

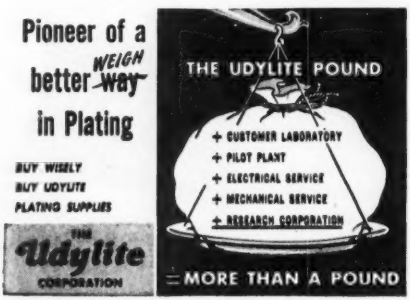
An air-operated Automatic Buffing Compound Applicator that will accommodate bars up to ten inches wide (two inches thick) has been announced by the George L. Nankervis Company, 19255 W. Davison, Detroit 23, Mich. Designated the Model 610, it becomes the ninth model available in a series of electric and air applicators accommodating round and rectangular compound bars.



Nankervis Automatic Compound Applicator—Model 610

The applicator can be installed on all types of buffing machines from simple lathes to multi-operation automatics. Light weight construction permits installation on floating heads without disturbing balance. It can be installed in any position without affecting operation.

An important feature of the new applicator is its ability to feed any number of strokes per minute — applying compound only when required. For example, it can be installed so as to apply compound only during the buffing cycle, withdrawing while the work



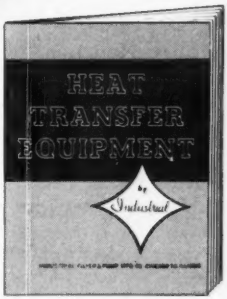
HEAT EXCHANGERS

for CORROSIVE and NONCORROSIVE LIQUIDS and GASES

Industrial tailored units

Whether for laboratory or pilot-plant requirements or large-quantity processing, it will pay you to look into the INDUSTRIAL tailored units for heating or cooling liquids or gases. Rather than adaptations of standard units, INDUSTRIAL heat exchangers are engineered and built to individual performance specifications. Depending on size and other operating conditions, the INDUSTRIAL heat exchanger may be a large single- or multiple-pass tube-bundle type or a series, parallel, or series-parallel combination of individual single- or multiple-tube units. In any type unit, thermal shock and the requirements of the corrosive or noncorrosive fluid on the tube or shell side determines the materials of construction. Thus, each INDUSTRIAL tailored heat exchanger embodies the ultimate in operating performance and efficiency at lower initial and maintenance costs.

Get INDUSTRIAL'S recommendations for your next heat transfer equipment.



This Bulletin describes the INDUSTRIAL service on heat transfer equipment. Ask for Bulletin 600-2.

5058

INDUSTRIAL

FILTER & PUMP MFG. CO.

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PRESSURE FILTERS
DEMINERALIZERS
RUBBER LININGS
HEAT EXCHANGERS
CORROSION TEST CABINETS
CENTRIFUGAL PUMPS

changes from station to station in the machine. In addition, it is also possible to operate up to eight applicators simultaneously from a single controlling valve, applying compound uniformly to all buffs. With each application, the compound is fed forward to compensate for "wear down" of the bar. The rate of feed is adjustable from 0.0015 to 0.015 inch per stroke.

Major parts of the applicator are fabricated of cast aluminum to minimize overall weight. All operating parts are covered to seal out dirt, wheel lint and compound. Moving parts are bearing mounted to ensure trouble-free service and smooth operation.

For information circle No. 10 on Reader Service Card inside back cover.

Portable Air Compressor

A line of portable air compressors in a variety of models has been introduced by the DeVilbiss Co., 300 Phillips Ave., Toledo, Ohio.

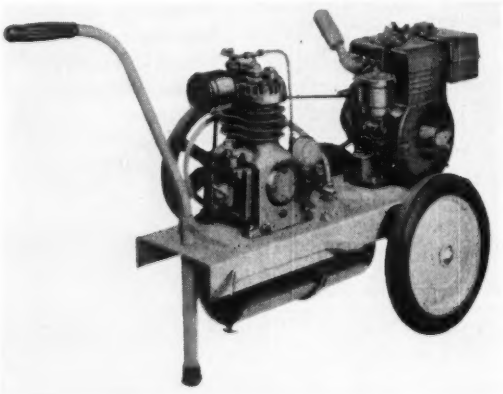
Designed expressly for spray painting is a 1 horsepower model, rated at 60 pounds maximum pressure and delivering 5.4 c.f.m. of air. For general utility work, DeVilbiss has engineered a ½ and 1 horsepower compressor, both having a 100 pound maximum pressure rating. The 1 horsepower unit delivers 4.2 c.f.m. of air and the ½ horsepower model has an output of 1.91 c.f.m.

All compressors are available with either electric or gasoline motor as power source.

The compressor and motor are mounted on a sturdy chassis which has two large diameter wheels with rubber tires. A convenient handle, used to guide the unit, can be removed quickly for transporting the complete unit in a passenger car.

The compressing unit is built for heavy duty, long and trouble-free service. Air being taken into the unit is filtered to prevent entry of dirt or dust which would create excessive wear on all parts.

For information circle No. 11 on Reader Service Card inside back cover.



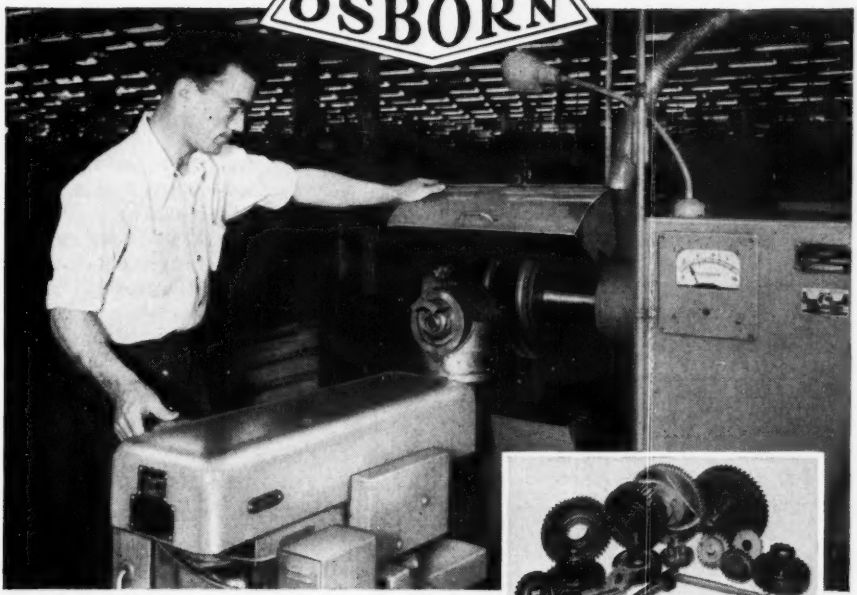
Portable Air Compressor

Phosphatizing Prior to Silicone Coating

A process announced by The Diversey Corporation makes it possible to phosphatize steel and then apply silicone finishes. The process, built around Diversey Divobond, is claimed to clean, rustproof and give greater finish adherence to the metal all in one spray application.

In addition to its use with silicone paints, Diversey Divobond can be used as a "one-

OSBORN



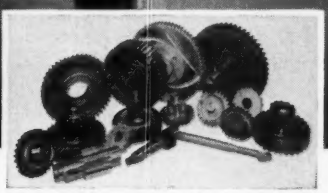
Blends surface junctures... saves over 1000 manhours

...Power brushing with the Osborn *Brushamatic** shown above replaced hand methods on a job of burr removal and finishing 17 different gears for material handling trucks. Net saving is over 1000 production hours a year per machine. Moreover, *quality* and uniformity of gears are greatly improved.

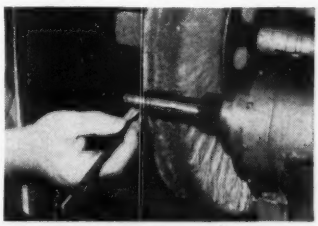
The operator simply pushes a button and the *Brushamatic* goes through a complete cycle to remove burrs and feather edges, and *blend* surface junctures *automatically.*

Users of *Brushamatic* machines are improving quality and increasing output as much as 500% over hand methods. Find out how your **O**sborn **B**rushing **A**nalyst can help *you* cut costs, improve quality and boost production. Call your **OBA,** or write *The Osborn Manufacturing Company, Dept. O-17, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

*Trade-Mark



Brushamatics can be preset to desired time cycle for accurate duplication and uniformity of results. Above: Group of completed parts. Below: Threaded shaft set up for microfinishing.



INFORMATION: *Write today for your copies of Booklets on Automatic Deburring and on Brushamatic Machines.*

Osborn Brushamatic

BETTER QUALITY...LOWER COSTS...AT THE PUSH OF A BUTTON

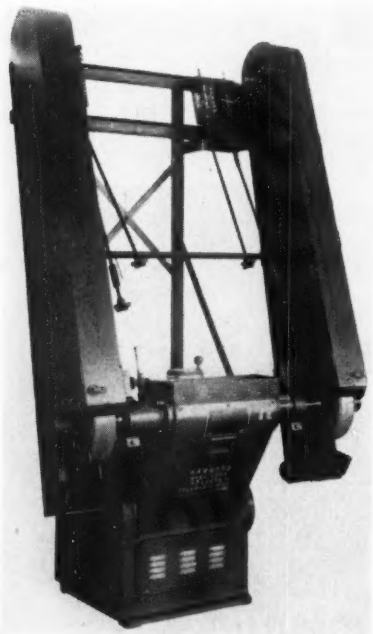
shot" cleaning, rust-proofing and paint adhering process. It is claimed to operate over a wide pH range and is thus far less critical in use.

Readers interested in testing Divobond may secure samples of the product or may send in test panels for coating. Requests for samples or test panels should be sent to Divobond Department, Diversey Corporation, 1820 Roscoe Street, Chicago 13, Illinois.

For information circle No. 12 on Reader Service Card inside back cover.

Grinder-Polisher

Hammond Machinery Builders, Inc., 1622 Douglas Ave., Kalamazoo, Mich., has combined a polishing lathe and abrasive belt backstands to construct a compact, space-saving grinder-polisher. The mounting structure is attached to the base of the Model VRO Variable Speed Polishing Lathe to which the backstands are mounted instead of the more conventional method of mounting the backstands in back of the lathe. Abrasive belts up to 14 ft. long can be used. The same arrangement can be furnished with most Hammond polishing lathes, and the backstands can be either spring or air-tensioned models.



Grinder-Polisher

For information circle No. 13 on Reader Service Card inside back cover.

Zinc Phosphate Coating Material for Iron and Steel

Oakite Products, Inc., has announced the addition to the company's group of prepaint conditioning materials of Oakite CrysCoat SW, a new zinc phosphate coating material for iron and steel, designed for use in pressure-spray washing machines.

Oakite CrysCoat SW, the manufacturers state, provides a fine-grained, dense and uniform zinc phosphate coating on iron and steel that meets U. S. Government specification Jan-C-490, Grade I, and similar specifications. The coating weight ranges from 180 to 220 mg. per square foot. One-minute application in the phosphating stage of a 5-stage pressure-spray washing machine is usually sufficient to obtain the coating weight desired, it is reported.

Among the advantages claimed for Oakite CrysCoat SW are the following: (1) its zinc phosphate coating develops very rapidly on metal surfaces, particularly in deep cavities; (2) the coating is fine-grained, dense and relatively non-porous; (3) the solution is highly buffered for long life; (4) the

New Non-Flammable

PEELABLE PLASTIC BOOTH COATING

BY

PELRON®

MAKES PAINT BOOTH OPERATION SAFE!

Here is *new* PELRON PLASCOTE 284—a new plastic booth coating that is *non-flammable either as a liquid or as a dry film on the booth.* This means not only greater safety in booth maintenance operations, but also a reduction in insurance costs.

Due to the ease of application and extensive coverage, booth maintenance costs may be reduced by more than 50%. PLASCOTE 284 is shipped ready to use—no premixing necessary—will dry to a tough peelable film in a matter of minutes.

Order a 5 gallon trial quantity *at regular drum price.* Do it now and learn how this revolutionary new coating gives more protection to your employees and plant!

PELRON *Corporation*

7740 W. 47th Street
Lyons, Illinois
Phone BI shop 2-3166
(Chicago)

product is inhibited for safety on equipment surfaces; (5) the only upkeep required to maintain an operating solution is the material itself. Upkeep is easily determined by a simple titration procedure using equipment supplied free of charge by the manufacturer.

A special Service Report, giving application details of Oakite CrysCoat SW, will be sent to readers writing on company letterhead to Oakite Products, Inc., 120 Rector Street, New York 6, N. Y.

For information circle No. 14 on Reader Service Card inside back cover.

Metal Identification Kit

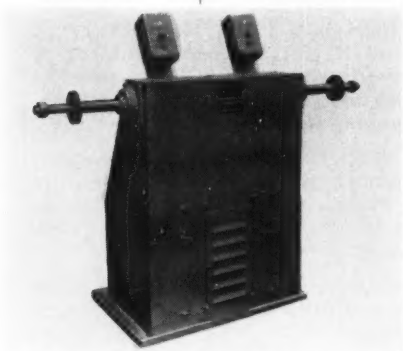
With the Chemi-Spot metal identification kit, over 80 of the commonly used metals and alloys appearing on the market today may be identified using simple, well known chemical spot-testing procedures.

The kit, available from Wescott Laboratories, Elizabethtown, N. Y., weighs 12 pounds, is contained in a portable brown leatherette carrying case and comes equipped with all the necessary chemicals except the concentrated acids which must be supplied by the purchaser. Included also is a booklet, "Rapid Identification (Spot Testing) of Some Metals and Alloys," published by The International Nickel Company, Inc.

For information circle No. 15 on Reader Service Card inside back cover.

Dual 5 H.P. Motor Driven **POLISHING LATHE**
$795.00

Single 5 H.P. Motor Driven **POLISHING LATHE**
$450.00

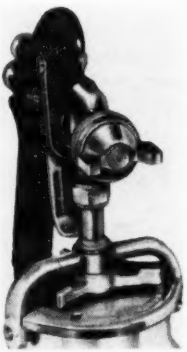


An outstanding value! Rugged ½" steel fabricated construction. Simple design permits shaft assembly to be removed as a unit. Heavy $1\frac{1}{16}$" polished and ground shaft. 17" spindle clearance with L & R inside threads. Tried, proven and accepted by thousands of satisfied users.

METAL FINISHING MFG. CORP.
89 North 11th Street Brooklyn 11, N. Y.
SERVICING THE INDUSTRY FOR 35 YEARS

Siphon Nozzle

A siphon nozzle for spray painting, known as the 66SF, has been announced by the Binks Manufacturing Co., 3118-40 Carroll Ave., Chicago 12, Illinois.



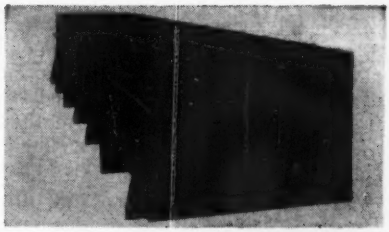
Siphon Nozzle

Designed for a siphon setup on a Binks Model 18 Spray Gun, which has long occupied top position in the Binks line, the nozzle is stated to make the Model 18 more efficient and versatile.

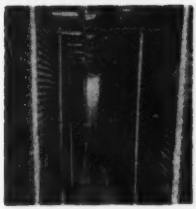
According to the manufacturer, the 66SF nozzle offers several advantages for such industrial applications as painting machinery, individual products and small areas, or wherever a siphon cup setup is called for. Among the major claims are "double" atomi-

● A true advancement in electroplating, ARco Diaphragm Systems have created a new standard in plating quality. Simply installed, Diaphragm Systems segregate anolyte from catholyte through canvas barriers between anode and cathode. This electroplating method, combined with ARco Rubber Lined Tanks and planned solution circulation, filters metallic insolubles from outside sources.

Reduce costly buffing due to roughness . . . prevent rejects because of thin spots . . . have ARco engineers show you how Diaphragm Systems can save time, materials . . . and customers.



● ARco Two Work Lane Diaphragm Plating Tank



● ARco Horizontal Diaphragm Installation

For uniformly high quality and economy in plating...

DIAPHRAGM SYSTEMS *and* RUBBER LINED TANKS *by* ARco

ARco Vertical Diaphragm Installation

AUTOMOTIVE RUBBER CO., INC.

12564 BEECH ROAD • DETROIT 28, MICH.

Manufacturers • Designers • Engineers

●

ARco RUBBER PROCESSORS
4033 Homestead Road
Houston • Texas

ARco Diaphragm Plating Tank, return bend type

AUTOMOTIVE RUBBER CO., INC.
12564 Beech Rd., Detroit 28, Mich.

Please rush me _____ copies of your "Diaphragm Tanks Promote Plating Progress."

Name_____

Firm_____

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City_____ State_____

zation, a wider spray pattern, less air consumption, 15 per cent faster flow of fluid, smoother finishes with synthetics and lacquers, and less time out for gun cleaning.

The use of twin side ports results in double atomization and a wider spray pattern. The fluid is broken down into finer particles; the finish goes on smoother, faster and laps better.

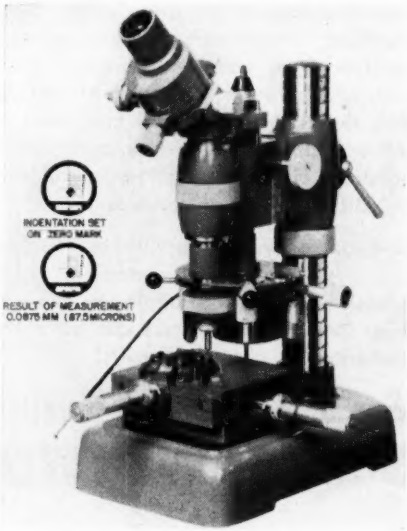
Although primarily developed for use with Binks Model 18 Gun, the new 66SF nozzle can also be used with Models 19 and 29.

For information circle No. 16 on Reader Service Card inside back cover.

Hardness Tester

A hardness testing instrument making only the most minute scratches or impressions, which cannot be seen with the naked eye and are so small that even the finest finish is not marred by the test, has been developed by the George Scherr Co., Inc., New York 12, N. Y.

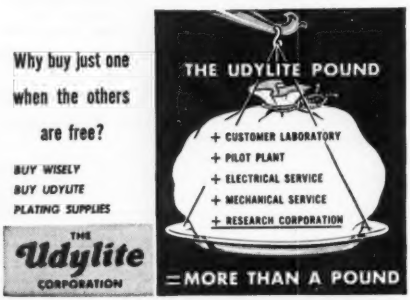
It is a portable, bench type instrument which combines a positive, controlled diamond penetrating action with a microscope of 400 magnifications. The microscope is swung directly over the impression to read the hardness by measuring with a reticule scale and vernier.



Hardness Tester

Instructions and tables are furnished with the instrument converting readings into Rockwell and other standard hardness scales in use.

For information circle No. 17 on Reader Service Card inside back cover.

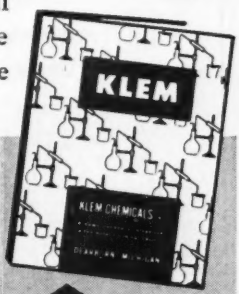


Bench Backstand with Air-Inflated Contact Wheel

Nu-Matic Grinders, Inc., Cleveland, Ohio, and Ryman Engineering Co., Ellwood City, Pennsylvania, have announced a bench, belt grinding machine for deburring gears, finishing small castings, grinding all types of stampings and similar operations.

Being air-inflated, the Nu-Matic

It's the quality of the job you get and the savings in material, time, heat, etc., that make KLEM chemicals preferred. That's why one of the largest and most modern plating operations in the automotive industry recently chose Klem chemicals in preference to all others. The Klem man in your area may have the answer to your tough problem – if he doesn't the Klem lab does. Send us a sample for trial.



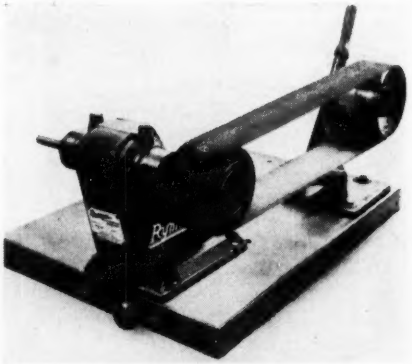
WRITE FOR
THIS CATALOG

KLEM
CHEMICALS, Inc.
14401 LANSON AVE., DEARBORN, MICHIGAN

contact wheel is resilient and flattens out like an auto tire at point of contact. Thus, abrasive contact area is increased up to 3,000 per cent, resulting in faster finishing.

The unique design of the Nu-Matic wheel also provides increased belt life due to the self-cleaning action developed as the belt passes over the flattened wheel area, and due to the fact that the wheel equalizes belt stresses. Smoother surfaces are obtained, and faster finishing of contoured surfaces results, because the resilient drum shapes itself to the surface of the work and provides increased contact area.

The Ryman backstand assembly is designed for use with a 60 inch abrasive belt and will accommodate 5 and 8-inch diameter Nu-Matic drums. The idler wheel is mounted on a spring-loaded lever that is manually operated to facilitate quick belt change. This lever also maintains proper belt tension. The complete assembly is mounted on a steel base or in any other way desired. However, the drive motor is always mounted underneath. Motor, motor mount and steel legs to make a table model are all available.



Bench Backstand

For information circle No. 18 on Reader Service Card inside back cover.

NEW
Barrel Nickel
BRIGHTENER
—can be used with present Barrel Nickel plating solutions
- Faster Plating
- Brighter Finish
- Single Addition Agent
- Hot or Cold Solutions
- Many *plus* Advantages

Information on request

JELCO PRODUCTS
153 East 26th Street, New York 10, N. Y.
LExington 2-3055

Chromate Reducer for Cleaning Solutions

Enthone, Inc., Dept. PF, 442 Elm Street, New Haven, Conn., has announced "Chromekill 4A" for destruction of hexavalent chromium contamination in alkaline cleaning and plating solutions.

Chromekill 4A was designed to give a dual action. It contains materials for fast reduction of hexavalent chromium to the harmless trivalent chromium state, and it also contains more stable reducing agents to give prolonged protection. The material is available as a fine free-flowing powdered mixture and is used in concentrations of the order of ¼ oz./gal.

DO A BETTER JOB FASTER...

cut cleaning costs right down the line

METALWASH Spotless Dryer
eliminates hand wiping of lacquered and plated parts

The **METALWASH** Spotless Dryer is specifically designed for the spotless drying of plated and polished parts.

The Spotless Dryer blasts the water from all surfaces of the work *mechanically* with jets of high velocity room-temperature air. This *instantaneous* water-stripping, *completed before evaporation begins,* removes every trace of stain-causing dissolved salts.

The work is then conveyed through a hot-air blow-off which evaporates all moisture remaining in seams and folds, and at points where the rack touches the work.

Spotless Dryers normally are furnished as complete units with built-in conveyor and drive, or they can be built to fit into any existing conveyor line.

METALWASH VAPOR DEGREASERS *provide new speed, economy, durability.*

METALWASH TRIPOLI REMOVER *automatically removes tripoli and rouge.*

METALWASH PHOSPHATIZING MACHINES *provide ideal surface for lasting paint finishes.*

METALWASH ®

WASHING PICKLING DRYING
PHOSPHATIZING DEGREASING

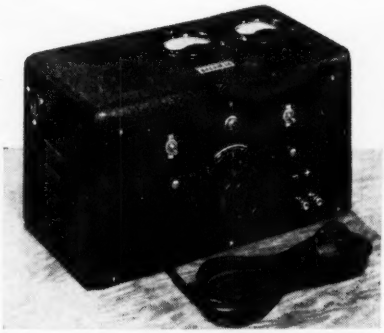
METALWASH MACHINERY CORPORATION
915 North Avenue, Elizabeth 4, N. J.

A test solution for determining the presence of hexavalent chromium in alkali cleaners as well as plating solutions is available to customers of Enthone.

For information circle No. 19 on Reader Service Card inside back cover.

Selenium Rectifier

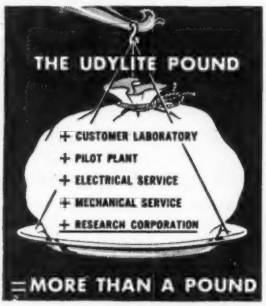
The Selenium Rectifier Model 5B, manufactured by Kocour Co., 4814 S. St. Louis Ave., Chicago 32, Ill., is a self contained power supply, designed to meet exacting requirements, featuring dependable accuracy and long life. AC input, 115 volts, 60 cycles; DC output 0 - 6/12 volts at 5 amperes continuous duty ratings. Full wave bridge type selenium rectifier stack. Powerstat control over entire range from 0 to maximum. Smooth DC output with less than 5 per cent ripple due to choke input filtering.



Model 5B Selenium Rectifier

For information circle No. 20 on Reader Service Card inside back cover.

Would you like to get extras for the dollars you spend?



If you would, buy Udylite plating supplies. As a Udylite customer, you get quality plating products with pluses profitable for you.

The Udylite Customer Service Laboratory is at your service to assist in finding the best materials for processing your products. Our Pilot Plant will find the most economical method of obtaining the finish you desire. And our Mechanical and Electrical Service specialists are always available for on-site testing and servicing of any equipment in your plant.

Combined with the superior plating products developed by the Udylite Research Corporation, these extra services insure perfection results at lowest cost. For a pound that's more than a pound, *Buy Wisely—Buy Udylite Supplies.*

THE Udylite CORP. • DETROIT 11, MICH.

Stop-Off Lacquer

A peelable stop-off lacquer known as Miccropeel has been announced by Michigan Chrome and Chemical Co., 8615 Grinnell Ave., Detroit 13, Mich.

Miccropeel may be used in all plating cycles to hold a hairline demarcation. After plating, it may be readily peeled, saving time and money over laborious soak and scrub stripping operations.

Miccropeel may be brushed, dipped or sprayed.

For information circle No. 21 on Reader Service Card inside back cover.

Circulating Paint Heater

Pigmented finishes and fillers can now be hot sprayed efficiently, regardless of their abrasive content, according to The Spee-Flo Co., 720 Polk Ave., Houston, Texas, manufacturer of the

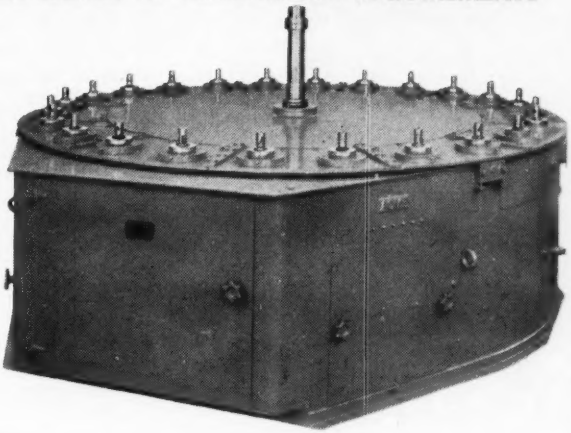
ACME *Rotary Automatics* ARE AVAILABLE

IN EITHER INDEXING OR CONTINUOUS TYPES

. . . TO MEET A WIDE RANGE OF PRODUCTION REQUIREMENTS

This ACME 10-ft. Combination Rotary, may be used for either indexing or continuous operation. It is equipped with 24 continuous revolving spindles for continuous rotary travel or for twelve station indexing operation utilizing every other spindle. When indexing, this table travels station to station with one second interval and up to 1200 indexes per hour.

CATALOG ON REQUEST



Meet Production Schedules with ACME *Automatics!*

Acme Automatic Polishing and Buffing Machines provide a dependable solution to the problem of maintaining high civilian or defense production schedules at minimum unit costs. These highly efficient machines are available in types to handle parts of virtually any size or shape, with a wide variety of arrangements and accessory equipment to meet the specific finishing requirements. Problems of polishing, buffing, grinding, wire brushing, de-burring and Micro-finishing are effectively solved by Acme Automatics.

For recommendations, send blue prints of part or samples before and after finishing operations, with detailed information on finishing operations and production requirements. If production methods will cut your costs. we can set your job up in our experimental department and you can inspect it in operation.

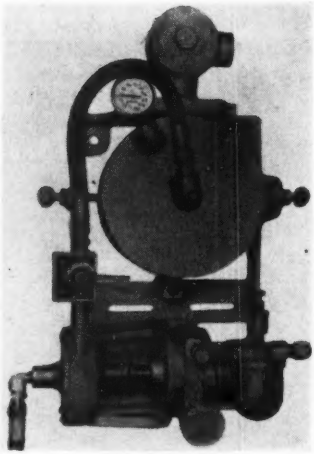
ROTARY STRAIGHT LINE SEMI-AUTOMATIC AND SPECIAL *Polishing and Buffing Machinery*

SPECIAL MACHINERY — AUTOMATIC BUFFING MACHINES

ACME *Manufacturing Co.*

Builders OF AUTOMATIC POLISHING AND BUFFING MACHINES FOR NEARLY HALF A CENTURY

1400 E. 9 MILE RD., DETROIT 20 (Ferndale) MICH.



Circulating Paint Heater

Air Circaflo Pressurematic heater.

The air Circaflo has an integral air motor centrifugal pump which circulates the material from the heater to the gun and return, to maintain a constant hot spray temperature for continuous and intermittent service. The simple centrifugal pump has no close fitting tolerance to wear and is, therefore, particularly designed for paint circulation. Fluid pressure at the gun remains constant, and is totally unaffected by air pressure variations and pump speed.

The heating unit in the air Circaflo Pressurematic is a coil-less heat exchanger that cannot clog and requires no maintenance. Because pump speed may be regulated to a minimum, air consumption is low.

The Model 300-APA is rated at 9 gallons per hour and Model 600-APA is rated at 18 gallons per hour.

For information circle No. 22 on Reader Service Card inside back cover.

Electric Conveyor Screen Bake Oven

Steiner-Ives Company, 657 Springfield Rd., Union, N. J., pioneer in the industrial oven field for over 60 years,

PAINT MIXER

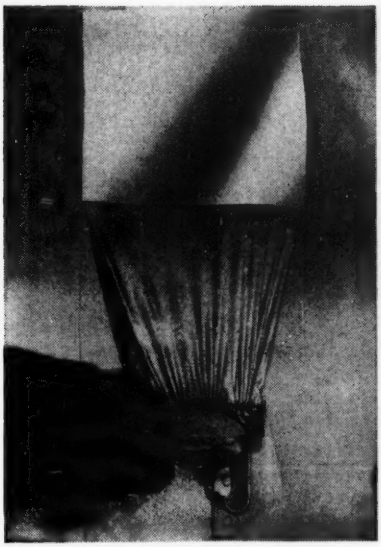
MIRACLE
5 GALLON
PAINT REJUVENATOR

All paint restored to original consistency without opening the can.
2 minutes per gallon.

MIRACLE PAINT REJUVENATOR CO.
127 E. 9th St., St. Paul 1, Minn.

MASKING TAPE
DIE-CUT TO YOUR EXACT SPECIFICATIONS FROM
SCOTCH BRAND
INDIVIDUAL PIECES • ANY SIZE OR SHAPE
For quick, accurate masking operations.
PHONE OR WRITE PANOCO
166 HENRY STREET, STAMFORD, CONN.

For a real good polishing job use
Keystone TURKISH Emery
FRESH SUPPLY AVAILABLE
KEYSTONE EMERY MILLS Write for Sample 4316 Paul St., Phila., Pa.



Keep it Clean

WITH MUNRAY Peel-kote

To clean over-spray from booth walls, grilles and exhausts, merely cut Peel-kote and rip it off in large easy-to-handle sheets. New Peel-kote can be re-sprayed on booth in minutes using standard equipment.

Peel-kote will not support combustion, it possesses maximum flexibility and is aluminum in color. It reduces fire hazards in your booths, increases illumination, and reduces your maintenance costs to a minimum. Peel-kote has better adhesion qualities and at the same time is easier to peel off. Its higher solids content permits quicker build-up of heavier film for greater protection and easier stripability.

In addition, MUNRAY formulates other types of Peel-kote to meet a wide range of requirements, such as protection of polished or plated metals during production, handling, shipment and even actual installation of product.

MUNRAY corrosion protection for industry

MUNRAY Products, Inc.
12400 CROSSBURN AVE. CLEVELAND 11, OHIO
SUBSIDIARY OF FANNER MFG. CO.

MUNRAY PRODUCTS, INC.
12400 Crossburn Ave. • Cleveland 11, Ohio
Send additional information on Peel-kote for:
( ) Spray Booth Maintenance (Peel-kote type SP)
( ) Protection of highly finished surfaces, products and parts.

NAME ..... TITLE .....
ADDRESS .....
CITY ..... ZONE ..... STATE .....

CUSTOM-FORMULATED PLASTISOLS, PROTECTIVE COATINGS, TANK LININGS AND HIGH QUALITY PLASTIC PIPE AND TUBING

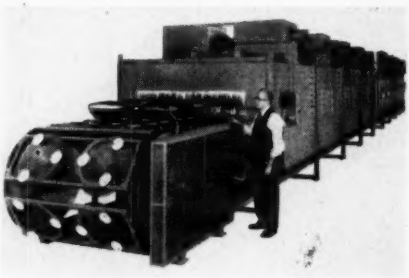
have announced an Electric Conveyor Screen Bake Oven with a built in purging system to handle aluminized cathode ray tubes.

The oven is constructed so as to permit the addition of an air purge system for processing aluminized tubes with temperatures regulated so that the purging air that is blown into the tube is the same temperature as the corresponding air in that section of the oven.

Heating system is of the recirculated air type, with heating sections individually controlled to insure proper baking schedules. Cooling sections are also controlled for uniform heat discharge.

The conveyor speed is variable with a mean speed of about 14 inches per minute.

Steiner - Ives has constructed the Electric Conveyor Screen Bake Oven in 9 sections. Each section measures 9½ feet long, with inside oven dimensions of 51 inches high by 84½ inches wide. The total oven length is 85½ feet; total overall length of the entire unit is 105 feet. Operating power from



Bake Oven for Cathode Ray Tubes

330 to 480 kilowatts will enable the Steiner-Ives Electric Conveyor Screen Bake Oven to attain temperatures of up to 750 deg. F.

The Steiner-Ives Company also builds other type ovens to meet specific heating needs.

For information circle No. 23 on Reader Service Card inside back cover.

Hull Cell

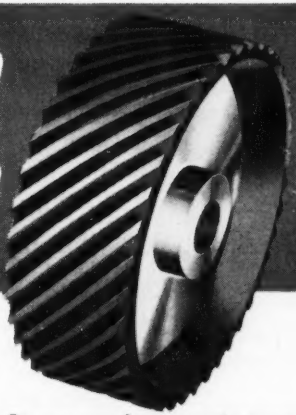
The Model "WT" Hull Cell, developed by R. O. Hull & Co., Inc., 1304 Parsons Ct., Rocky River 16, Ohio,

CHEMSTEEL CONSTRUCTION COMPANY, INC.
301 Chemsteel Bldg., Walnut St., Pittsburgh 32, Pa.
Send data on Engineering & Construction facilities for
ACID-ALKALI-PROOF CONSTRUCTION
of processing & storage tanks & flooring in
☐ Steel Plant ☐ Chemical ☐ Textile ☐ Food
NAME.....
COMPANY.....
ADDRESS.....
CITY..... ZONE ..... STATE ....

McKeon's "Liquid Sulphur"
Most economical, most satisfactory method of
STRIPPING COPPER.
Brochure on request.
Sulphur Products Co., Inc.
228 McKEON WAY GREENSBURG 6, PA.

DON'T BE FOOLED BY FALSE CLAIMS
ROBERTS ROUGE COMPANY
STRATFORD, CONN.
Originators of Micro-Lustre Finishers
★ Fine buffing compounds are a combination of the best of materials and years of manufacturing experience.
Since 1881 A LONG TIME TO CONTINUE SUCCESSFULLY

CUTS COSTS like Magic!



Chicago Rubber Company's amazing new R54 contact wheel cuts better—faster—longer and will substantially reduce your grinding and polishing costs 3 ways.

This precision machined and accurately balanced wheel is easily and quickly knocked down and reassembled for tire replacement or change.

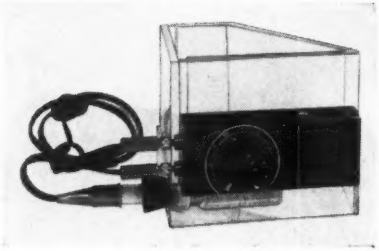
- Replace only the rubber tire when necessary instead of the entire wheel.
- Choose from a complete assortment of tire treads for different grinding operations, still using the same wheel.
- And as usual Chicago Rubber Company's R54 contact wheel allows you to get the most wear from your abrasive belt—more than you ever got before.

There is a replaceable rubber tire with proper tread for every grinding requirement and in a wide variety of durometer ratings. Write for descriptive literature.

"IT'S THE WHEEL THAT DOES THE WORK"

CHICAGO RUBBER COMPANY, INC.

Main Office & Factory
2620 N. Clybourn Ave. Chicago
Makers of the COSMOWHEEL



Model "WT" Hull Cell

provides a simple and accurate method for control of plating baths operated at elevated temperatures.

The complete unit consists of a Lucite Hull Cell mounted with a waterproof, variable - control thermostat. This is connected in series with a 110 volt (a.c. or d.c.) quartz immersion heater located in the base of the unit. Thermostat automatically controls temperature at plus or minus 3 deg. Fahrenheit.

For information circle No. 24 on Reader Service Card inside back cover.

Carry-Over Stop for Chrome Plating Solutions

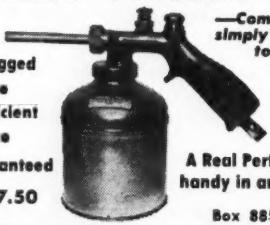
Magnus NZ, a special concentrated wetting agent developed and produced by Magnus Chemical Co., Inc., 208 South Ave., Garwood, N. J., is stated to prevent the carry-over of chrome plating solution into the final rinse.

Following a cold running water rinse of plated parts, they are rinsed in a cold still tank containing Magnus NZ solution at a concentration of 16 oz./gal. Following a cold spray rinse, the work is ready for the final hot soak. None of the plants using Magnus NZ in the manner outlined above has experienced further carry-over trouble.

For information circle No. 25 on Reader Service Card inside back cover.

Production of nickel by the free world is believed to have approximated 340,000,000 pounds in 1953, an increase of about 20,000,000 pounds over 1952 and 50,000,000 pounds over 1951.

Portable Sandblast Gun



—Complete— simply connect to air line

Rugged • Efficient • Guaranteed

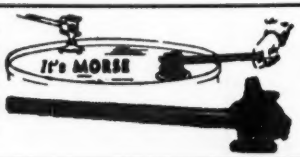
$27.50

A Real Performer handy in any shop

LINDBERG PRODUCTS CO., Box 885 P Los Gatos, Calif.

Send NOW for this FIT-ALL **DRUM PLUG WRENCH**

Instantly loosens, tightens 95% all plugs or bungs in steel drums. Has 16" extra-strong steel tubing handle. Wgt. only 2 lbs. Order 1 or more today!



THOUSANDS IN USE saving time, labor, accidents!

SATISFACTION GUARANTEED.... **$3.30**

Non-sparking type ....$5.10 *Plus Parcel Post*

MORSE MFG. CO., Inc. 762 W. Manlius St., E. Syracuse, N.Y.

ACID RESISTING MASTIC AND ACID PROOF BRICK FLOORING AND LINING CONSTRUCTION GIVES

COMPLETE PROTECTION AGAINST ACIDS AND ALKALIES

RALPH V. RULON, INC., 3900 No. 2nd St., Philadelphia 40, Pa.

Acidproof Construction Contractors for Over 50 Years

You WILL BE IN GOOD COMPANY when YOU USE...

SURPHOS®

Metal Phosphating Chemical

Currently Used On:

Sheet Steel, Machined and Cast Iron . . . Truck Hoods and Fenders . . . Auto Accessories . . . Tractors and Accessories . . . Clothes Washers . . . Stoves . . . Dish Washers . . . Hot Water Heaters Jackets . . . Air Conditioning Cabinets . . . Gas and Oil Space Heaters . . . Outboard Motors . . . Toys . . . Agriculture Implements . . . Lighting Fixtures . . . Diesel Locomotives . . . Many other items.

TO USE SURPHOS:

. . . dissolve in hot water to a concentration of one ounce per gallon and apply to metal by dipping or spraying in a power washing machine. Acid proof equipment not needed.

SURPHOS *Conditions Metal For Painting:*

- **CLEANS**
- **FORMS PHOSPHATE COATING**
- **PREVENTS RUSTING**
- **IMPROVES ADHESION of PAINT**
- **INCREASES HUMIDITY and SALT-SPRAY**
- **RESISTANCE OF PAINT**

INDUSTRIAL CHEMICAL PRODUCTS COMPANY

3778 BELLEVUE AVENUE **DETROIT 7, MICH.**

Representatives In Principal Cities

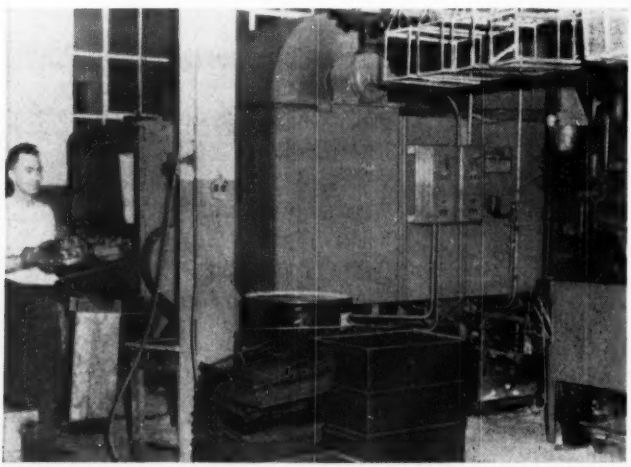
In Canada made and sold by Boyle Chemicals Ltd., Longbranch, Ont.

Practical Applications of modern products

Cleaning Filter Parts

IN the Meriden, Conn., plant of the Cuno Engineering Corporation, liquid and gas filters for a wide range of industrial uses are manufactured. Before assembling filters it is necessary to clean and degrease all parts, and Cuno has installed a gas-fired Industrial Washing Machine, made by the Industrial Washing Machine Corp., of Matawan, New Jersey, to do this work. The parts are placed on a chain type conveyor belt and are first degreased by spray washing in an Oakite solution at a temperature of 170 deg. F. This is followed by a clear hot water spray rinse.

The machine which is 32 feet long, 2 feet, 3 inches wide; and 8 feet, 11 inches high; has a capacity of 1,000 square feet of metal per hour.



Operator places filter parts on chain conveyor of Industrial power washer in which they are alkali cleaned and rinsed.

Special Enamel Finish Baked on Wire Spoke Hub Caps with Far-infrared Heat

THE newest thing on wheels is the wire spoke hub cap. A method which is used to heat-cure special enamels on these and other automobile accessories has been developed so that in one plant, 200 hub caps an hour are finished by the new method, utilizing far-infrared electric heat.

The problem at A. S. Campbell Co., Inc., East Boston, Mass., was to obtain quick but thorough curing of alkyd - urea - phenol - formaldehyde - melamine enamel on the wheel discs. However, the baking oven must also be flexible enough to handle paint baking of other parts of different sizes. These include grill and bumper guards, license plate frames and bumperettes.

An installation of 24 Chromalox electric radiant panels designed and manufactured by Edwin L. Wiegand Co., Pittsburgh, Pa., met these require-

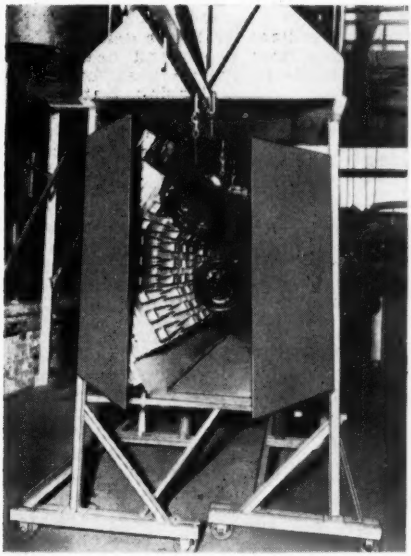


Fig. 1—End view of baking oven containing 24 Chromalox electric radiant panels.

halves. These sections are mounted on casters so that the oven can be adjusted for different sizes of parts and for heating requirements. Each panel is four feet long, giving a 16-foot oven with four heat zones.

The exact heat is measured out for each part by means of four input controllers and eight magnetic contactors. Each contactor energizes a group of three panels and the input controllers modulate the output of several panels from 0 to 100 per cent of capacity for close vernier control. For fast curing finishes or for very light work any section of the oven can be turned off.

A continuous conveyor takes parts from paint booths through the radiant oven (Fig. 1), and on to the take-off point. Conveyor speeds can be varied from two to eight feet per minute. Average time in the oven is only four minutes for the wheel covers, while curing time for other parts is between 1½ and 8 minutes.

ments. Because the modular panels are standard and have built-in electrical connections, the oven was assembled and put into operation in record time.

The panels, which are rated at 10.8 kilowatts each, were easily bolted to simple steel framing to form two oven

Fig. 2—Completed wire spoke hub cap with thoroughly cured enamel finish.

When parts leave the oven, their temperature is about 400 deg. F. To allow time for cooling, and to save floor space also, the parts are raised to the ceiling and carried overhead to the unloading point.

IRRADIANT GRID BULLETIN. A bulletin describing Granco Irradiant Grids (flameless gas burners) is available from **Granco, Inc.**, 317 Thirty-Second St., S. W., Grand Rapids 8, Mich. Granco Irradiant Grids are designed for use in gas fired ovens and heaters of various kinds to provide heat for paint drying, water drying, metal processing, and other processes requiring oven treatment at elevated temperatures. Illustrations showing several different types of plant installations are included in the bulletin.

Circo Vapor Degreasers use 30% less solvent

CIRCO
CROSS ROD DEGREASER

New, modern Circo vapor degreasers — whether large or small — are engineered to save on solvent consumption. Construction features like balanced condensing coils, leak-proof pumps and dual vapor-level control are today saving companies 30% and often more in solvent use. Circo degreasers perform faster, save precious man-hours through engineering designs developed through 30 years experience in vapor degreasing.

Circo Introduces Ultrasonic Cleaning

Write for details on the most modern, talked about metal cleaning development of the century—the Circosonic degreaser that cleans small metal parts by the power of sound.

Send for Circo's comprehensive 32-page Manual on Vapor Degreasing. No Obligation.

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PER-SOLV (Perchlorethylene) CIRCO-SOLV (Trichlorethylene)
Vapor Degreasers • Metal Parts Washers • Dryers • Solvent Recovery Stills

AEROVENT FAN ENGINEERING MANUAL. A 64-page, illustrated guide to modern industrial ventilation and air movement is available from **Aerovent Fan Co., Inc.**, 720 E. Ash St., Piqua, Ohio. Engineering, installation and operating data, for all standard and special-duty fan applications, and pertinent details for calculating duct sizes, friction losses, performance and horsepower requirements are included in **CATALOG NO. P-20.** Full details and description of all Aerovent Fans and accessory equipment are covered by the manual.

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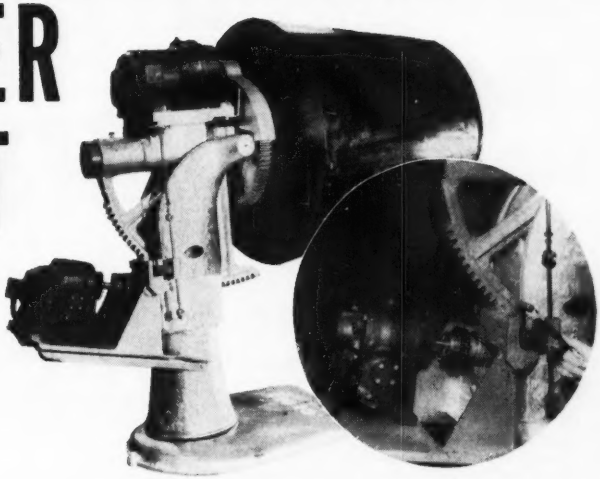
POWER TILT



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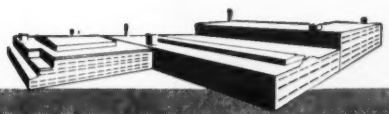
Fingertip tilting brings you the advantages of faster tumbling cycles, reduced operator fatigue and savings of floor space in your finishing department. Globe's new tilting mechanism enables your operator to quickly move the barrel to pre-selected or manually selected operating position by means of a simple, 3-position reversing control.

Write for Tumbling Barrel Bulletin B-9



WHAT'S YOUR FINISHING PROBLEM?

Let HUPP's experimental engineering service analyze your parts finish needs. Send samples of parts and completed piece to show desired finish. HUPP will provide detailed cost-saving finishing recommendations. Write today! No obligation, of course.

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NEWS of the Industry

COMPANIES

THE MICHIGAN OVEN COMPANY, designer and builder of ovens for industrial heating and processing, has announced the appointment of the **J. R. ENGLE COMPANY** as representative in Cleveland and Northeastern Ohio.

Owned and operated by Joe R. Engle, the Engle Company is located at 1900 Euclid Avenue, Cleveland 15, Ohio.

Business outlook for the balance of 1954 is "very encouraging," A. O. Thalacker, president of the **DETREX CORPORATION,** Detroit, said at the company's annual meeting of stockholders.

Pointing out that 1953 sales of the company had risen 19 per cent over 1952, Mr. Thalacker said this trend is continuing in 1954. First quarter sales for Detrex, manufacturer of chemicals, metal-cleaning machinery and drycleaning equipment, are running 6 per cent over the comparable period of 1953, he declared.

Currently touring the United States and Canada, is **CORNING GLASS WORKS'** traveling van (Fig. 1), bringing to manufacturers and industrialists the complete story of the use of Pyrex brand "Double-Tough" glass pipe, heat exchangers and fractionating columns in production processes.

The van is 34 feet long, 8 feet wide and 11 feet 2 inches high. It has interior lighting by Corning, Fiberglas insulation and a Fiberglas acoustical ceiling by Owens-Corning Fiberglas Corp. The basic color is gray, with red, white and blue trim.

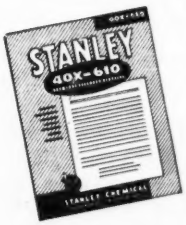
The van is manned by Corning Glass Works personnel, plus the local CGW sales engineer in the particular area being visited and

Fig. 1—Corning Glass Works' traveling van, housing an exhibit of Pyrex Glass Pipe.

Weatherproofs in ONE OPERATION

Stanley 40X-610 one-package WASH-PRIMER

Now steel or iron parts can keep the weather at bay throughout a year of outdoor storage without topcoating. Reason: Stanley 40X-610. This one-package, one-operation wash primer for spraying, brushing, or dipping forms a weather-tight skin that lasts. Its resistance to corrosion and rust creep is excellent. And Stanley 40X-610 may be used with most topcoats. Find out more about this low-cost, easy-to-apply outdoor protection . . . write today for the new bulletin on Stanley 40X-610 to: Stanley Chemical Company, 31 Berlin Street, East Berlin, Connecticut.



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STANLEY CHEMICAL

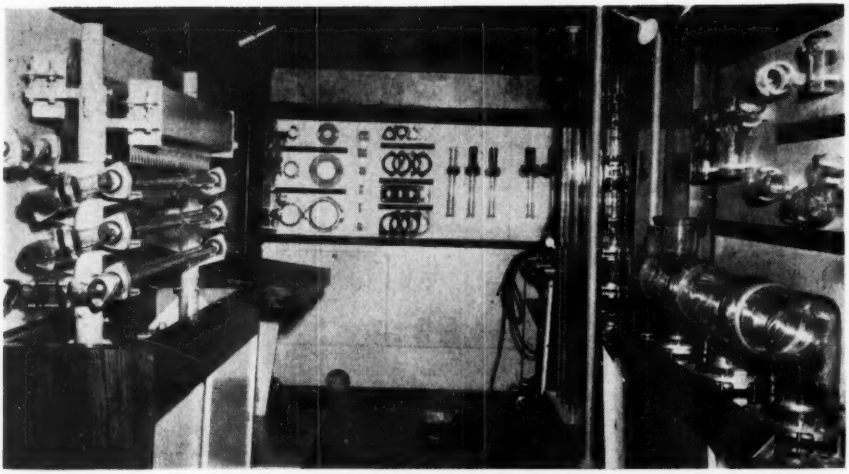

Fig. 2—Interior of van showing a portion of the glass pipe applications on exhibit.

the sales engineer from the distributor in that area.

Built-in displays in the interior of the van (Fig. 2) include such operating units as a cascade cooler, a jacketed heat exchanger, and a packed column. On exhibition also are assorted sizes of pipe and fittings. Van visitors will see the ease with which Pyrex brand pipe can be adapted to other piping materials and equipment, and a field fabrication kit is available to demonstrate the ease of cutting and flanging glass pipe in the field or on the job.

Kenneth Rolley

The opening of a new sales office in the Park Square Building, 31 St. James Street, Boston, Mass., has been announced by A. H. Hartman, director of sales for **CONSOLIDATED VACUUM CORPORATION.** This new sales location will add another link to the growing nationwide chain of offices made available to service high vacuum equipment users.

KENNETH ROLLEY, formerly of Rochester, New York, will be in charge of this office which will serve the states of Maine, New Hampshire, Vermont, Massachusetts, and Rhode Island. Mr. Rolley, a native of the Boston area, is a graduate mechanical engineer from the University of Rochester. He brings to the customers for high vacuum equipment in the New England area a thorough knowledge of the industrial applications of Consolidated Vacuum Corporation's products.

Complete furnishings for a private room were recently donated to Alexian Brothers' Hospital, in memory of the late Pierre I. Chandeysson, founder of **CHANDEYSSON ELECTRIC COMPANY,** St. Louis, Mo.

This gift is one of many received by the Hospital from the Chandeysson family. Their interest is underlined by the fact that Dr. Chandeysson in his lifetime was always devoted to the medical work of the Alexian Brothers.

HENRY R. POWER retired on May 1 from The Carborundum Company, Niagara Falls, New York, after 37 years of

service with that company.

He served the abrasive industry as chairman of technical committees which developed standards for testing abrasive grains used in polishing wheels, grinding wheels, and coated abrasives.

Robert J. Racine

Robert J. Racine, manager of industrial sales for **WYANDOTTE CHEMICALS CORPORATION**, recently outlined plans to the company's 17 district sales managers for expanded customer service. Mr. Racine was a featured speaker at Wyandotte Chemicals' annual district sales managers' conference.

In addition to describing several new industrial products for water wash spray booths and for

Tom Todd, Los Angeles district sales manager of Wyandotte Chemicals Corporation, at left, discusses expanded service plans for the aircraft industry with P. N. Burkard, manager of industrial and aircraft sales for this Wyandotte, Michigan, organization, during the recent annual week-long conference of the 17 Wyandotte Chemicals district sales managers.

Speed Up Your Finishing Operations with CENTRAL POLISHING MACHINES

Hydraulically operated. Anyone can operate. Extremely versatile. Handle long lengths, extrusions, sheets and many odd-shaped pieces. Polish extrusions and sheets their ENTIRE LENGTH. Polishing stroke quickly adjustable 2 inches to full capacity. Our patented Hydraulic Contour Device permits the finishing of a wide variety of shapes and contours.

- Polishes extrusions and sheets complete, end to end.
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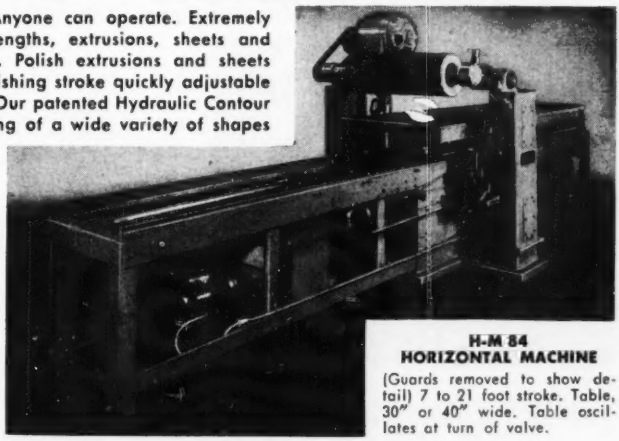
- Adjustable stroke 2" to full capacity.

Machines, 7 to 21 foot stroke.

FULL INFORMATION ON REQUEST.



H-M 84 HORIZONTAL MACHINE

(Guards removed to show detail) 7 to 21 foot stroke. Table, 30" or 40" wide. Table oscillates at turn of valve.

CENTRAL MACHINE WORKS

72 COMMERCIAL ST. • WORCESTER, MASS.

preparing metal for painting, Mr. Racine told of Wyandotte Chemicals' expanded manufacturing facilities for floor absorbent.

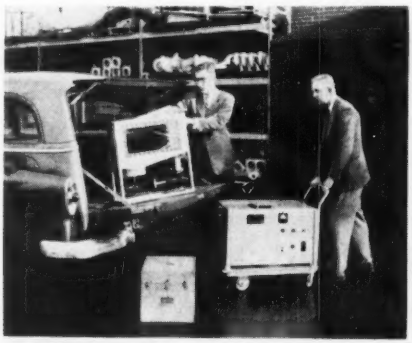
New solution testing devices, expanded advertising and additions to Wyandotte's service staff were also announced by Mr. Racine.

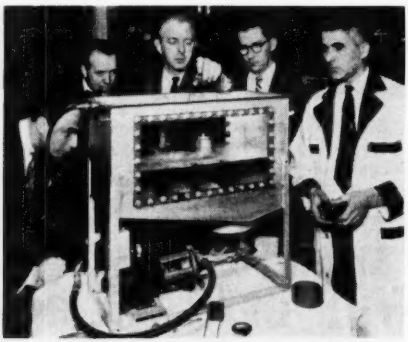
The **DETREX CORPORATION** of Detroit has formed a special team of ultrasonic demonstrators to tell American industry the story of the remarkable advances made in the use of ultrasonic energy for the precision cleaning of metal.

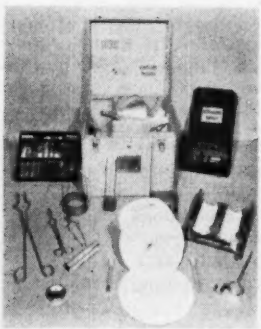
Just a year ago, Detrex announced that it had taken high-frequency sound energy out of the laboratory stage and had developed its fully-conveyorized Soniclean Process, an ultrasonic metal cleaning system that was practical for the needs of modern industry.

To answer the flood of inquiries and requests for further data and demonstrations, Detrex first tackled the huge job of sorting through and indexing them. Then followed the publication of a technical brochure. The next step was the formation of a special team of ultrasonic demonstrators and the preparation of an itinerary that will keep them on the road for an indefinite period.

Headed by Kermit D. Collom, in charge of ultrasonics sales, installation and







(Upper left) Donald C. Johnson and Kermit D. Collom, members of the ultrasonic demonstration team of the Detrex Corporation, unload generator and small, ultrasonic degreaser. (Upper right) Mr. Collom, center, shows speed and thoroughness with which sound energy degreases metal part, as key plant executives watch through glass sides. (Lower left) Complete ultrasonic demonstration equipment is shown here. Filter paper in degreaser shows amount of soil removed from supposedly clean part. (Lower right) Some of the items carried in the demonstration kit are pictured here. Note contrast between soiled and fresh filter paper. Degreaser used in demonstrations is a miniature model.

service, demonstrators will show ultrasonics in action with the aid of a carefully-assembled, complete kit including a small degreaser, a ¼-kilowatt generator, solvent, plastic-coated baskets, magnetic field detector, microscope, variable-position transducer holders, tool kit, and other miscellaneous items.

The demonstrations will be made in hotels convenient to many firms in a given area, before meetings of technical societies, and directly in the plants of individual companies.

A full-sized degreaser, incorporating an ultrasonic cleaning cycle, has been installed in the Detrex laboratories in Detroit for demonstration purposes. Glass windows in both this machine, and the smaller, portable unit, permit spectators to watch sound energy at work.

Appointment of **ROBERT LePAGE** as supervisor of the process engineering section of the abrasives laboratory has been announced by Minnesota Mining & Manufacturing Co. Mr. LePage joined 3M in 1949 as a chemical engineer in the abrasives laboratory. Prior to his new appointment, he was supervisor of basic research in the same department.

In his new position, Mr. LePage will be responsible for research and development activities concerning present and potential coated abrasive manufacturing processes as well as experimental coatings for other laboratory groups.

NEW POSITIONS

Steps taken in recent weeks by Hanson-Van Winkle-Munning Co., Matawan, N. J., manufacturer of electroplating and polishing equipment and supplies, include the intensification of plating supply activity on the West Coast, opening of a new office in St. Louis, and the extension of sales and service facilities to cover all major western industrial areas.

H-VW-M recently purchased the Electroplating Equipment & Supply Division

How thick is the coating?

Check with an ELCOMETER . . . new type thickness gauge for spot checks on non-magnetic coatings: porcelain enamel • paints • platings • foils • glass • paper • plastics • etc.

Accurate to ± 5% ± .0001".

For flat or curved surfaces in hard-to-get-at spots without loss of accuracy. Needle locking device assures a correct reading every time.

Comes with tough, leather case containing inner pocket for test strips.

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C. A. Pickering (left), William A. Nairne, A. H. Nicholson, William T. Walling, G. Stuart Krentel

of A. J. Lynch Co., Los Angeles. The Lynch plating division formerly represented H-VW-M in California. H-VW-M, however, is using its newly acquired facilities and personnel to extend sales and service coverage from California to Washington, Oregon, Idaho, Nevada, Utah, Arizona, New Mexico, Wyoming and Montana.

Headquarters have been set up at the new St. Louis office to service Kansas, Oklahoma, Arkansas, Texas, Louisiana, Missouri and the St. Louis trading area in Illinois. **JOSEPH J. CIZAS** was recently appointed sales representative for the territory.

Formerly this territory besides other western states was covered by **C. A. PICKERING** of H-VW-M. Under the new expansion and consolidation plan, Mr. Pickering will concentrate his sales activities in Colorado, Nebraska, Iowa and northwestern Illinois. **L. J. MOYES**, presently covering Wisconsin and Minnesota, will acquire the territories of North and South Dakota. Supervising the areas covered by the three is **R. R. GRANQUIST**, who maintains his headquarters in Chicago.

As a result of the purchase of the plating division of the Lynch Company, three Lynch plating salesmen joined H-VW-M. They are **WILLIAM A. NAIRNE, G. STUART KRENTEL** and **A. H. NICHOLSON.** All three have had extensive experience in the plating and polishing fields.

William Nairne was with Lynch for six years. A graduate of the University of Arizona and a member of the American Electroplaters' Society, he will continue to cover the Los Angeles territory.

G. Stuart Krentel, recently elected president of Los Angeles branch of American Electroplaters' Society, has been connected with the electroplating business since receiving his M.S. degree from Michigan State College in 1933. He will continue to cover Los Angeles.

Mr. Krentel's background includes research and development work at Chrysler Engineering Corp. and Rufert Chemical Division of Seymour Mfg. Co., production and control work with Bay Manufacturing Division of Electric Auto-Lite Corp., and Spence Electro Plating Co. of Los Angeles, and sales and service work with MacDermid, Inc.

A. H. Nicholson, who will continue to serve the San Francisco area, has been associated with the metal finishing industry for the past eight years. A graduate of Wooster College, Wooster, Ohio, he worked as a plating chemist for Daystrom Corp., Olean, N. Y., for three years. He later supervised metal finishing operations at Daystrom's west coast plant in Fullerton, Calif. Mr. Nicholson, a member of the A.E.S., was also formerly associated with Sundmark Supply Co.

Retaining supervision of west coast operations is **HAROLD R. SMALLMAN**, assistant vice president of H-VW-M. Under the new arrangement H-VW-M will retain its principal western distributors. They include Carl F. Miller Co., Seattle and Spokane; Zehrung Chemical Co., Portland; Southwestern Platers' Supply Co., Dallas; Brance-Krachy Co., Houston; E. R. Frost Co., Minneapolis and G. S. Robbins Co., St. Louis.

Hanson-Van Winkle-Munning Co., Matawan, N. J., has assigned electrochemist **WILLIAM T. WALLING** to the Chicago area.

Mr. Walling will be associated with **E. C. BOSL**, who is presently covering

this territory and several midwestern states. Besides supplementing the work of Mr. Bosl, Mr. Walling will be available for service throughout the Midwest. Mr. Walling has been doing field electrochemical service work in Matawan.

In addition to his electrochemical background, Mr. Walling has worked as a plater, and has experience in buffing and polishing. Originally trained at the H-VW-M laboratory in Matawan, he was graduated from Seton Hall University with a degree in chemistry.

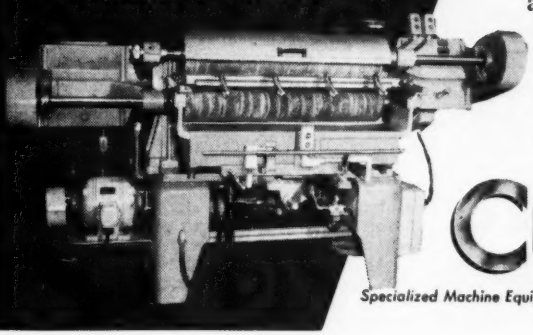
Herbert J. Griffing (left), Emens Guernsey

The retirement of **HERBERT J. GRIFFING,** Encapsulating Machine sales representative, has been announced by Norton Company of Worcester, Mass. **EMENS GUERNSEY** has been named his successor.

In his 35 years with the company, Mr. Griffing has worked on and sold practically every type of Norton grinding machine made. He began his career under Charles H. Norton who invented and developed the modern precision grinding machine at the turn of the century. He has been selling Norton machines since 1919.

Mr. Guernsey came to Norton after graduation from Wesleyan University in 1940. He was with the sales engineering department of the Grinding Machine Division until his present appointment.

FOR MAXIMUM VERSATILITY IN SURFACE FINISHING YOUR PRODUCT — FROM ROUGH GLAZE TO MIRROR FINISH!



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CLAIR Model 202

SURFACE FINISHING MACHINE

Designed for surface finishing flat or contoured products, this double-roll machine provides automatic float of buffs at any predetermined pressure. Hydraulic "in" and "out" stroke is adjustable from 0″ to 24″, and automatic spray equipment is available.

Write for Bulletin 202

CLAIR MANUFACTURING CO., INC.

Specialized Machine Equipment for Glazing and Polishing Operations

OLEAN, N. Y.

F. W. Kittrell (left), Charles W. Smith, and Byron H. Jacoby

F. W. KITTRELL has become associated with Frederic B. Stevens, Inc., Detroit 16, Michigan, as process and sales engineer on Industrial Waste Disposal.

After five years as research chemist with the Standard Oil Company (Indiana), Mr. Kittrell entered the public health field with the North Carolina State Board of Health in 1929. He was employed by the Tennessee Department of Public Health from 1930-41, continuing his specialization in stream sanitation and waste disposal activities as Chief, Stream Sanitation Section, Tennessee Valley Authority, through 1951. For the past two years he has engaged in radiological safety and radioactive waste disposal with the Isotopes Division of the Atomic Energy Commission at Oak Ridge.

Mr. Kittrell represents the Kentucky-Tennessee Industrial Wastes and Sewage Works Association of the Board of Control for the Federation of Sewage and Industrial Waste Associations. He has been a recipient of the Arthur Sidney Bedell Award and the Harrison Prescott Eddy Medal.

The selection of **CHARLES W. SMITH** as a representative in the Chicago area has also been announced.

Prior to joining Stevens, Mr. Smith had accumulated 26 years experience in the metal finishing fields. He has spent 3½ years as a superintendent at Craftsman's Plating and Tinning Company, Chicago; four years as superintendent of plating, polishing and buffing at Driscoll Company, Chicago; and over three years in the same capacity at the Webster-Chicago Corp.

He specialized in chemistry while at school and has been a member of the Chicago Branch A.E.S. for the greater part of 20 years.

BYRON H. JACOBY has been added to the sales staff of Frederic B. Stevens, Inc., in connection with the announcement of a new Central States sales district with headquarters in Dayton, Ohio.

Mr. Jacoby will cover a portion of the southwestern Ohio territory. Prior to joining Stevens he was in sales work and spent three and one-half years with the Frigidaire Division of General Motors Corporation.

Ralph Morse

Chandeysson Electric Company, St. Louis, Mo., has named **RALPH MORSE** plant engineer. In his new capacity, Mr. Morse will be in charge of all plant utilities, construction and maintenance. He will also carry out special assignments for the engineering and plant manager.

Formerly supervisor of Chandeysson's testing facilities, Mr. Morse has been with the company four years. Prior to joining the firm, he served as an electrical engineer for the Missouri Pacific Railroad. Mr. Morse is a graduate of the University of Missouri.

WALTER W. DENNEY has been placed in charge of polishing, electroplating and paint finishing at The Columbus Dental Manufacturing Company, Columbus, Ohio. Mr. Denney is a past president of the Columbus Branch of the American Electroplaters' Society, and has been active in society affairs for a number of years.

F. A. TRUDEN, former president and general manager of Southern Finishers, Inc., Nashville, Tennessee, is now associated with the Crosley Division, Avco Manufacturing Corp., Nashville, as process engineer.

Mr. Truden is a former officer and director of the National Association of Metal Finishers.

E. H. Peterson

Magnus Chemical Co., Garwood, N. J., manufacturer of industrial cleaning materials, metal working lubricants and cleaning equipment, has announced the appointment of **E. H. PETERSON** as sales manager.

With Magnus since 1947, Mr. Peterson has served in engineering and sales capacities, and was appointed assistant to the president in 1952.

A graduate of Worcester Polytechnic Institute, he holds a Master's Degree from Stevens Institute of Technology, and is a doctoral candidate at New York University.

Walter Klie, Jr.

The appointment of **WALTER KLIE, JR.,** as zone manager, Great Lakes Industrial Sales, for The Sherwin-Williams Co., has been announced by Don S. Gaarder, general manager of the firm's Industrial Sales Division.

Mr. Klie, who joined Sherwin-Williams in 1936, will make his headquarters in Grand Rapids, Michigan. He is a graduate of the University of Virginia and has had extensive experience in many phases of the paint industry, having held sales positions in the Indus-

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Any Quantity — Any Size

New Polishing Wheels

Grain

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Compounds

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3503 Gaylord Ave., Detroit 12, Mich.

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fine wire

SCRATCH BRUSHES

SINCE 1856

For Platers, Silversmiths, Jewelry Mfgrs., Makers of Watches, Clocks and Electronics and other metal finishers.

Supplied in straight or crimped brass, steel, nickel silver or stainless steel wire in sizes .0025 to .006 and in bristle, fibre or Nylon. Special sizes and shapes to order.

catalog and price list.

Write (Dep't. P) on your letterhead for

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ESTABLISHED 1856

trial, Automotive and Trade Sales divisions of Sherwin-Williams. From 1947 to 1953 he was stationed on the West Coast, serving large furniture producers in the Southern California area.

Prior to his present appointment, Mr. Klie served as a Products Finishes sales supervisor in the company's South Atlantic Sales Region, and made his headquarters in Philadelphia.

Gottfred L. Hendrickson

GOTTFRED L. HENDRICKSON has been appointed resident sales engineer to serve the Minnesota, North Dakota and South Dakota area, it has been announced by L. J. George, Chicago district manager of The Udylite Corporation.

Mr. Hendrickson has 20 years' experience in metal finishing. His previous experience includes supervision of metal finishing at McGraw Electric Co. in Elgin, Ill., and at General Mills Home Appliance Dept. in Minneapolis. He will service the area from his office at 1834 Lincoln Street, N. E., Minneapolis, Minn.

Appointments to six new sales and research managerial posts in Diamond Alkali Company's recently formed Chlorinated Products Division have been announced by C. E. Lyon, vice president and general manager of the division.

DR. D. J. PORTER, formerly assistant to the director of research, has been named assistant general manager and division research director. He will be responsible for all research work of Diamond's Chlorinated Products Division except agricultural chemicals.

DR. J. J. LUKES, formerly development section manager, has been named research manager, and will assist Dr. Porter in carrying out divisional research responsibilities and functions.

W. B. BEESON, JR., sales manager since June, 1953, of Belle Alkali Company, Belle, W. Va., a Diamond subsidiary, has become product sales manager for Diamond chemicals manufactured at the Belle plant as well as other chlorinated solvents, including perchlorethylene and carbon tetrachloride, and hydrochloric acid.

W. J. ESSELSTYN, formerly a technical service representative, will work with Dr. Beeson as solvents sales manager.

M. T. WALSH, a sales promotion representative since 1951, has been named sales manager in charge of Chlorowax and related products.

D. C. NEVLING, plant auditor at Diamond's Houston Works for the past five years, has moved up to the position of divisional administrative assistant.

Appointees to these new positions will be located in Cleveland wth the exception of Dr. Lukes, who will carry on his work at the Diamond Technical Center in Painesville.

The Lea Mfg. Company of Waterbury, Conn., has announced the appointment of **JOHN GUSS** and **JOHN A. DOYLE** as sales and engineering representatives.

John Guss will serve the Midwestern area in a sales and engineering capacity on electrochemical and abrasive finishing problems. Mr. Guss, a graduate of Albright College, was chief chemist and metallurgist for four years at Penn-Ohio Steel Corp., Birdsboro, Pa. He was also associated with Valley Platers, Inc., Reading, Pa., Division of Wallace R. Ives, Inc., and Birdsboro Armor Cast, Inc., Birdsboro, Pa.

John Guss (left), John A. Doyle

John Doyle will specialize in sales and engineering service to the cutlery and small tool industry on surface finishing problems. A graduate of Catholic Uni-

versity Engineering School, he was associated with Sperry Gyroscope Co., Douglas Aircraft Corp., International Silver Company and G. I. Scott Mfg. Company.

Mr. Doyle will also serve as an engineering consultant on the application of liquid buffing compounds to Clair surface finishing machines.

Two industrial sales appointments in Pittsburgh Plate Glass Company's paint division have been announced by E. D. Peck, vice-president in charge of the paint and brush division.

WILLIAM. T. CAREY has been named director of sales, petroleum and transportation finishes, including aircraft and marine. **JOHN A. BURKE, JR.**, has been named assistant director of sales, petroleum and transportation finishes, including aircraft and marine.

Both men will have headquarters at the company's general offices.

Appointment of **WILLIAM H. HOGBEN** to the newly created position of executive manager, automotive accounts, of Pittsburgh Plate Glass Company's Ditzler Color Division in Detroit, also has been announced by Mr. Peck.

A native of Lyminge, England, Mr. Hogben joined the company's Milwaukee Paint Division in 1921. A graduate of Abbotsford College in Folkestone, England, Mr. Hogben in 1927 was assigned to the Ditzler Color Division where he has served as industrial sales manager.

E. DUDLEY KRESS is succeeding Mr. Hogben as industrial sales manager for the Ditzler Color Division.

A native of Ithaca, Michigan, Mr. Kress started with the Ditzler Color Division in 1931. Prior to his appointment he was general assistant manager of industrial sales for Ditzler.

EARL H. HEATON was named assistant to the industrial sales manager at Ditzler. A graduate of the University of Colorado, he has served as service manager of the Ditzler Division which specializes in the production and distribution of automotive finishes.

J. M. WELDON has been transferred to the General Sales Department of The International Nickel Company, Inc., as assistant to the vice-president, according to W. C. Kerrigan, general sales manager.

In other appointments, **C. J. BIANOWICZ** has been named manager of the Inco Nickel Alloys Department, and **DANIEL W. MACHON** has been placed in charge of the newly established Cobalt Section of the Nickel Sales Department.

JOSEPH S. McCULLOCH has been appointed manufacturer's representative for the Pennsylvania Salt Manufacturing Company's Corrosion Engineering Products Department, Robert R. Pierce, manager, has announced.

A graduate of Princeton University, Mr. McCulloch is well known in the corrosion engineering field in which he has had more than twelve years of technical and sales experience.

In his new assignment Mr. McCulloch will represent Pennsalt as sales engineer for chemical-proof cements, acid-proof mortars, chemical-resistant membranes, and corrosion-resistant coatings. His territory will cover Maryland, Delaware, Eastern Pennsylvania and Southern New Jersey.

A. E. S. 41st ANNUAL CONVENTION, Statler Hotel, New York City, July 12 to 15, 1954.

The Educational Sessions to be held at the **A.E.S. 41st Annual Convention** will include the following speakers and subjects:

"Leveling Studies in Cyanide and Acid Copper Plating Solutions," by Barnet D. Ostrow and Fred I. Nobel, Lea Ronal, Inc.

"Industrial Applications for Metallized Non-Conductors," by Dr. Harold Narcus, Electrochemical Industries.

"Modern Industrial Paint Strippers," by Rubin Operowsky, Chemclean Products.

"Servo Control in the Electropolishing of Wire and Strip," by A. Korbelak, Editor, "Plating" Magazine, and C. G. Rively, Westinghouse Electric Corp.

"Some Considerations of Importance in Ball Burnishing," by A. S. Kohler, Frederick Gum Chemical Co.

"Determination of Free Cyanide and Zinc in Zinc Cyanide Solutions," by Dr. R. F. Muraca, Lehigh University.

"Nickel Plating From the Sulfamate Bath," by Richard C. Barrett, Barrett Chemical Products Co.

"Electrochemical Corrosion Tests," by Walter Pinner and W. J. Pierce, Houdaille-Hershey Corp.

"A New Instrument for Measuring Stress in Electrodeposits," by Joseph B. Kushner, Joseph B. Kushner Electroplating School.

"Effects of Iron on the Physical Properties of Nickel," by L. H. Curkin and R. W. Moeller, Pratt and Whitney Aircraft Co.

"Copper-Tin Alloy Plating," by Dr. Charles L. Faust and William H. Safranek, Battelle Memorial Institute.

"Report of A.E.S. Research Committee," by Dr. Earl J. Serfass, Lehigh University.

"Stress in Chromium Electrodeposits," by A. C. Tulumello, Dr. E. J. Seyb and Dr. J. E. Stareck, United Chromium, Inc.

"Taper Sectioning of Basis Metal Surfaces and Electrodeposits," by Dr. A. E. R. Westman and Dr. F. A. Mohrnheim, to be delivered by W. M. Tucker, Eastman-Kodak Co.

"A Practical Application of Electroless Nickel Plating," by John P. McLean and Seymour Karten, Bulova Watch Co.

"Corrosion Protection of Modern Aircraft," by W. F. Castell, Lockheed Aircraft Corp.

"Disposal of Plating Wastes at Oneida, Ltd.," by Dr. B. F. Dodge and Dr. Charles A. Walker, Yale University.

"Lead as an Impurity in Nickel Plating Baths," by Dr. D. T. Ewing, Michigan State College.

"Effect of Anode Composition in Acid Copper Plating," by R. P. Nevers, R. L. Hungerford, and E. W. Palmer, The American Brass Co.

"Technology of Liquid Buffing Compositions," by R. V. Twyning, Twyning Chemical Specialties Co.

"Corrosion Properties of Electroless Nickel," by Richard W. Landon, Dr. G. Gutzeit, Kanigen Division, General American Transportation Corp.

"A Correlation of Metallurgical Hardness and Buffability," by R. S. Modjeska and Harold W. Faint, Scientific Control Laboratories.

"The Equipment to be Used for Determining the Effects of Oxide Films," by Dr. H. B. Linford and David O. Feder, Columbia University.

"Brass Plating," by R. A. Ehrhardt, K. G. Compton and G. Diettrich, Bell Telephone Laboratories.

"Throwing Power of Tin and Tin-Alloy Plating Solutions," by Dr. F. A. Lowenheim, Metal and Thermit Corp.

MEETINGS

The 15TH ANNUAL NEW ENGLAND REGIONAL MEETING of the **A.E.S.** will be held at the Hotel Bond, Hartford, Conn., on Saturday, May 15. This meeting is sponsored by the Hartford, New Haven, Springfield, and Waterbury Branches of the Society.

The program for the Technical Session beginning at 2:00 P.M. is as follows:

1. "Current Status of Electroless Nickel Plating," by Dr. Abner Brenner, Chief, Electrodeposition Section, National Bureau of Standards, Washington, D. C.
2. "Ultrasonics As Applied to Metal Finishing," by Dr. Wilfred Roth, Director of Research, Ultra Viscoson Corporation.
3. "Views of Japan." A color movie showing various phases of Japanese life, and views of the Japanese countryside. Presented by Ezra A. Blount, Editor, PRODUCTS FINISHING Magazine, Cincinnati, Ohio.

The Banquet and Dinner Dance is scheduled for 7:00 P.M.

Further information concerning this meeting may be obtained from William P. Innes, Technical Director, MacDermid, Inc., Waterbury 20, Conn.

Fig. 1—**A. E. S. Tri-State Regional Meeting Committee** members met the speakers at lunch prior to the Educational Session. Shown, facing camera, in upper photo (left to right) are: Arthur W. Logozzo; P. Peter Kovatis, A. E. S. executive secretary; J. M. Andrus; George W. Cavanaugh, General Electric Co., Syracuse; D. L. Taylor, co-chairman; Stewart Chipman, entertainment; Edwin Roof, hotel; Richard Jager, Columbus Branch representative.

Fig. 2—Shown in lower photo, facing camera (left to right) are: William Young, Cincinnati Branch secretary; W. Wilson Loveless, chairman; Carl H. Truman, Cincinnati Branch president; J. Gordon Seiter; William J. Neill, Columbus Branch; Dr. George P. Swift, A. E. S. President; Charles T. Nuzum, Zippo Mfg. Co., Bradford, Pa.; William D. Gordon, favors; Gordon T. Speers, finance; Robert K. Rarick, educational chairman; Robert D. Miller; Charles Wise, entertainment.

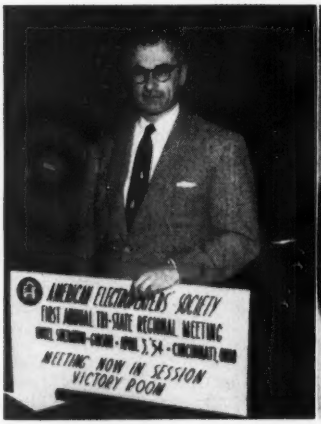

Fig. 3—Charles Wise, Buckeye Products Co. (above, left), wanted to be sure that members and guests attended the Educational Session.

Fig. 4—(Above, right) Speakers compare notes with Session Chairman Dr. George P. Swift. Left to right, J. M. Andrus, Croname, Inc., Chicago; J. Gordon Seiter, F. J. Stokes Machine Co., Philadelphia; Dr. George P. Swift, Watertown, Mass.; Arthur W. Logozzo, Nutmeg Chrome Corp.

Fig. 5 — (Above) A partial view of the well-attended educational session.

Fig. 6—(Left) Following J. Gordon Seiter's talk on "Vacuum Metallizing," a number of the members gathered to examine samples of metallized products and secure additional information on the process.

Fig. 7—The Standard Electrical Tool Co. invited Regional Meeting visitors to an open house. Shown inspecting a heavy duty polishing lathe in the Standard Electrical Tool plant are, left to right: George W. Cavanaugh, General Electric Co., Syracuse; William Ferguson, president of Standard Electrical Tool Co.; Ed Bruck, Platers Supply Co., Indianapolis; D. L. Taylor, Sealtron Corp., Cincinnati; Arthur W. Logozzo, Nutmeg Chrome Corp., W. Hartford, Conn.; J. M. Andrus, Croname, Inc., Chicago. *(PRODUCTS FINISHING Staff Photos)*

Fig. 1—(Below, left) Carl N. Becker, Becker Electrotype Co., Milwaukee, president of the **International Association of Electrotypers & Stereotypers, Inc.**, opened the **1954 Spring Conference**, held April 6-7 in Cincinnati. Shown at the left is A. P. Schloegel, executive secretary, and, at right, Walter C. Deye, Quality Engraving & Electrotype Co., Cincinnati, third vice president of the Association.

Fig. 2—(Below, right) John J. Chowning, Corning Glass Works, Corning, N. Y., presented a paper on Pyrex "Double-Tough" Pipe for use in connection with acid pickling or electrotyping solutions.

Fig. 3—Ed I. Peters, Process Engineering Co., Skokie, Ill., served as moderator of a panel discussion on "Copper Fluoborate Solutions and Installations" at the Conference. Shown with Mr. Peters on the panel are (left to right): Elmer Schwartz, first vice president; William Weber, Illinois Electrotype Co., Chicago; William Singer, Bomac 1952 Limited, Montreal; Mr. Peters; James E. Thomas, Capital Electrotype Co., Albany; and Carl N. Becker, Becker Electrotype Co.

Fig. 4—(Above) A panel discussion on "Nickel Sulphamate Solutions and Installations" was conducted by Richard Barrett, Barrett Chemical Products Co., Shelton, Conn. On the panel with Mr. Barrett are (left to right): Melbourne H. Lehr, Dayton Electrotype Co., Dayton; Milton Rectanus, Service Electrotype Co., Pittsburgh; Mr. Schwartz; Mr. Barrett; George Taylor, Bomac Limited, Toronto; and Joseph C. Ashmead, Neenah Electrotype Co., Neenah, Wis.

Fig. 5—(Below) Clifford Struyk, General Chemical Division, Allied Chemical & Dye Corp., Edgewater, N. J., led a panel discussion on "Tin Plating Solutions and Installations." Shown with Mr. Struyk are (left to right): Walter C. Deye, Quality Engraving & Electrotype Co., Cincinnati; Frank Flanagan, American Electrotype Co., Cleveland; B. R. Preston, Crescent Engraving Co., Kalamazoo, Mich.; Mr. Struyk; Fred Shelton, McCall Corp., Dayton; and R. Kreber, Van Bolt-Kreber Electrotype Co., Columbus, Ohio.

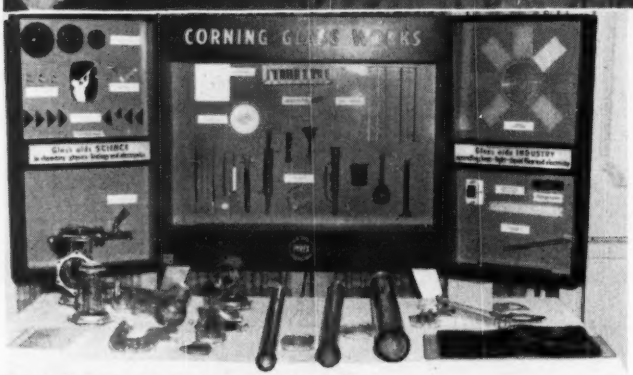

Fig. 6 — Among the exhibits at the Spring Conference of the Electrotypers' Association was that of the Corning Glass Works, Corning, N.Y., which featured the line of Pyrex "Double-Tough" pipe and fittings as well as other products for use in handling acid solutions in the electrotyping industry.

Fig. 7—Shown at the exhibit of R. Lavin & Sons, Inc., supplier of copper anodes and other metals to the electrotyping industry, are R. Scott Modjeska, Chicago, and A. S. Wigle. Mr. Modjeska addressed the electrotypers conference on the subject of "Rolled Versus Cast Copper Anodes."

(All photos by PRODUCTS FINISHING.)

TRAINING COURSES

A short home reading course on **"WATER AND WASTE CONTROL FOR THE PLATING SHOP,"** has been an-

nounced by the **JOSEPH B. KUSHNER ELECTROPLATING SCHOOL,** 115 Broad Street, Stroudsburg, Pa.

The course is intended for platers, metal finishing executives, chemists, and engineers who are faced or will be faced with the necessity of curbing or abating the nuisance of plating and finishing wastes, in order to comply with local pollution laws.

THE DeVILBISS COMPANY'S spray painting school, Toledo, Ohio, which during its 27 years of operation has been attended by thousands, recently was conducted for the largest group to attend a maintenance painting class this year.

The DeVilbiss spray painting course includes classroom lectures and demonstrations which are augmented by allowing each "student" to prepare materials and actually spray paint. Spray patterns are studied closely under actual painting conditions. The "student" is given adequate time to handle various spray guns so he can become accustomed to holding them correctly and to trigger them at the right moment. Special emphasis is placed on keeping the equipment clean and correct methods are demonstrated.

In the maintenance painting class, the "students" were from 11 states. Traveling the longest distances from the four compass points were: Louis J. DiZoglio and Gerard Boisvert, both of Lawrence, Massachusetts; Ralph Seegren of Tulsa, Oklahoma; Sidney W. Turner, Birmingham, Alabama; and Clifford L. Fishbeck, St. Paul, Minnesota.

meetings OF INTEREST TO FINISHERS

May 8. Masters' Electro-Plating Assn., Inc., 36th Annual Banquet and Entertainment, Starlight Roof, Waldorf-Astoria, New York City.

May 15. Indianapolis Branch, A.E.S., 11th Annual Dinner Dance, Indianapolis Athletic Club, Indianapolis, Indiana.

May 15. A.E.S. New England Regional Educational Session and Banquet, Hotel Bond, Hartford, Connecticut.

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May 17-19. American Institute of Electrical Engineers, Fifth Appliance Technical Conference, Morrison Hotel, Chicago, Illinois.

May 17-20. Basic Materials Conference and Basic Materials Exposition, International Amphitheatre, Chicago, Illinois.

May 24-27. Symposium on Instrumention for Industrial Hygiene, sponsored by the Institute of Industrial Health and the School of Public Health of the University of Michigan. Rackham Bldg., Ann Arbor, Michigan.

June 7. Institute of Cooking and Heating Appliance Manufacturers, 22nd Annual Convention and Exhibit, Netherland Plaza Hotel, Cincinnati, Ohio.

June 9-11. Eighth Annual Convention, American Society for Quality Control, Jefferson Hotel, St. Louis, Missouri. The 72 Technical Sessions will be held at Kiel Auditorium. For further information contact: U. C. Gramsch, Registrar, 8th Annual A.S.Q.A. Convention, P. O. Box 4436, Wade Sta., St. Louis 15, Mo.

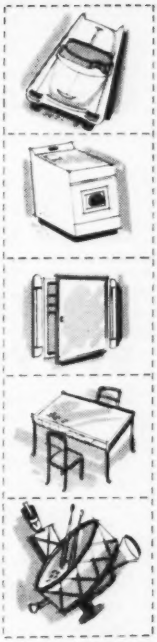
June 14-18. 1954 Annual Meeting, American Society for Testing Materials, Sherman and Morrison Hotels, Chicago.

Jul. 12-15. 41st Annual Convention American Electroplaters' Society, Hotel Statler, New York City.

The Finishing Touch **By J. A. Patterson**

"Look, lover boy . . . . can't you read?"

LESSON IN STAYING PUT



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Bonderite, Parker's corrosion resistant paint base, creates a tight phosphate coating, integral with the treated metal. The smooth, even coating provides a firm anchor for paint, resists corrosion and stops the spread of rust around scratches and breaks in the painted surface.

Literally thousands of metal products on the market today are protected with Bonderite. Automobiles, household appliances, business machines, metal furniture, electrical equipment, toys, and sewing machines are among the products treated with Bonderite. And their fine finishes last longer because of it.

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American Blower Fan, fin type, ball bearings, cage 21"x45"x36", 7½ HP Motor, perfect condition. Two unused steel lead lined tanks, 42"x 78"x83". Write Metal Furniture Company, Toccoa, Georgia.

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4-Stage Washer with drying section. Wire mesh conveyor adjustable 4 to 8 FPM, 2 separate lanes each with 18" x 6" opening, top and bottom sprays, 4 packless pumps. All but third stage with steam coils. This equipment installed but never used in production.

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27. Motor Generators designed specifically for use in electroplating, electroforming, electrocleaning, electrotyping, electropolishing, and other electrolytic processes, are described in Bulletin D-102 issued by the Chandeysson Electric Co., 4082 Bingham Ave., St. Louis 16, Missouri.

28. Degreaser Check Chart. A weekly economy check chart for the degreaser operator, designed to be located near each operating solvent degreaser, and listing a number of practices to be observed to obtain greatest operating economy is available from G. S. Blakeslee & Co., 1844 S. 42nd Ave., Chicago 50, Illinois.

29. Screen Process Printing Presses. Bulletins available from General Research & Supply Co., 572 South Division Ave., Grand Rapids, Mich., describe the construction and operation of the various models of the silk screen printing presses manufactured by the company. Supplies and equipment distributed by the company are also listed.

30. Metal Finishing Chemicals and Equipment. Products and processes for the electroplating, pickling, and metal finishing industry are described in technical bulletins available from Enthone, Inc., Dept. PF, 442 Elm St., New Haven, Connecticut. Specialized metal cleaners, metal strippers, paint strippers, black finishes, and a number of addition agents are described in the catalog.

31. Metal Protective Processes. A check list of metal protective and paint bonding chemicals and processes, which lists in convenient chart form chemicals, application methods, coating times and other variables necessary to the successful coating of various metals for different processes, is available from the American Chemical Paint Co., Ambler, Pennsylvania.

32. Paint Heaters. An illustrated folder being distributed by Bede Products, Inc., 1110 Brookpark Rd., Cleveland 9, Ohio, describes paint heating equipment and its use for spraying finishes at controlled, elevated temperatures.

33. Finishing Stainless Steels. Available from Armco Steel Corp., 2752 Curtis St., Middletown, Ohio, is a brochure describing surface finishing of Armco stainless steels by means of abrasive finishing, electropolishing, barrel finishing, and other processes.

34. Process Heating. Brochure No. 154, analyzing performance of Platecoil heaters in twelve heat transfer applications has been issued by Tranter Mfg., Inc., 636 East Hazel St., Lansing 4, Michigan.

35. Barrel Finishing Equipment. Catalog B-9, describing the various models of Globe tumbling barrels, deburring equipment, and finishing barrels, is available from Globe Stamping Div., Hupp Corp., 1250 W. 76th St., Cleveland 2, Ohio.

36. Power Brush Finishing, a booklet available from the Osborn Mfg. Co., Dept. 0-14, 5401 Hamilton Ave., Cleveland 14, Ohio, describes specific brushing equipment to accomplish various surface finishing processes. Brush characteristics and applications, design factors for brushes and brushing machines, are outlined, and a number of typical brushing applications are pictured.

37. Paint Supply Pumps. Catalog No. 436A, describing Grayco Heavy Duty Paintmasters, designed to supply paint finishing materials to the sprayer at controlled pressures, is available from Gray Co., Inc., Minneapolis 13, Minnesota.

38. Automatic Polishing and Buffing Machines. Acme Rotary automatic polishing and buffing machines for polishing and buffing, deburring, wire brushing and microfinshing, used in connection with set-up wheels, buffs, brushes or abrasive belts, are illustrated and described in a folder available from Acme Mfg. Co., 1400 E. 9 Mile Rd., Detroit 20 (Ferndale), Michigan.

39. Washing Machines. The application, design characteristics, elements and operation of Alvey-Ferguson washing machines for industry are contained in an illustrated catalog available from Alvey-Ferguson Co., 616 Disney St., Cincinnati 9, Ohio.

40. Industrial Process Heating. Pan-L-Heat ovens designed by Jensen Specialties, Inc., 9331 Freeland Ave., Detroit 28, Mich., for dehydrating, paint drying, baking curing or preheating, are described in a folder issued by the company.

41. Cold Cleaner. Houghto-Clean 445 Cold Cleaner for washing and cleaning metals prior to finishing operations is described in a product data sheet available from E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

USE CARD FOR FREE LITERATURE

42. **Vapor Degreasing Handbook.** Vapor degreasing processes, products, equipment design and proper operation, are described in a handbook available from Phillips Mfg. Co., 3547 W. Touhy Ave., Chicago 45, Illinois.

43. **Pressure-Cooled Buffs.** The line of pressure-cooled wheels and buffs, together with recommendations for their use in cutting and coloring various metals is described in a booklet available from United Buff Products Corp., 223-241 Oak St., Passaic, N. J.

44. **The Preparation of Steel for Painting.** "How to Apply Better Zinc Phosphate Coatings to Steel in Preparation for Painting" is the title of an illustrated booklet describing the Oakite Crys-Coat HC Process, available from Oakite Products, Inc., 20 Rector St., New York 6, New York.

45. **Electroplating Rotogravure Cylinders.** Bulletin R-100, offered by Hanson-Van Winkle-Munning Co., Matawan, New Jersey, describes the plating cycle for processing rotogravure cylinders by means of the Ballard Process. Technical details of the plating cycle, plating tanks, motor generator sets, and rectifiers, are described.

46. **Temperature Controller.** The Powers No. 11-MF Self-Operating Temperature Regulator for controlling the temperatures of plating, anodizing, phosphatizing, cleaning, pickling, rinsing, and other processing solutions, is described in Bulletin 330 issued by the Powers Regulator Co., Skokie, Illinois.

47. **Plating Barrels.** An illustrated folder listing dimensions and describing construction and operating features of Daniels Plating Barrels is available from Daniels Plating Barrel & Supply Co., 129 Oliver St., Newark 5, New Jersey.

48. **Buffing and Polishing Supplies.** Buffs, polishing wheels, buffing and polishing compounds supplied by the company are illustrated and described in a catalog issued by J. C. Miller Co., 55 Mt. Vernon Ave., N.W., Grand Rapids, Michigan. Included is a chart describing the characteristics of polishing and buffing compounds for various metals and listing typical applications.

49. **Spray Booth Coating.** A bulletin describing the use of Prox-Peel strippable spray booth lining is available from Pyroxylin Products, Inc., Chicago 32, Illinois.

50. **Batch Cleaning Machines.** Bulletin 704-AL, distributed by Magnus Chemical Co., Inc., Equipment Div., 208 South Ave., Garwood, N. J., describes metal parts batch cleaning by means of Magnus Aja-Lif Cleaning Machines. Specifications of various models and typical applications are listed.

51. **Backstand Idler.** The "61" Universal Backstand Idler for use in coated abrasive backstand grinding and polishing operations, is offered by the Coated Products Div., The Carborundum Company, Niagara Falls, New York. Operating features of the equipment are graphically illustrated and described.

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